Oregon State Monographs

# Trematodes
## *of the*
# Pacific Northwest
## *An Annotated Catalog*

Ivan Pratt
James E. McCauley

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# Trematodes

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# Pacific Northwest
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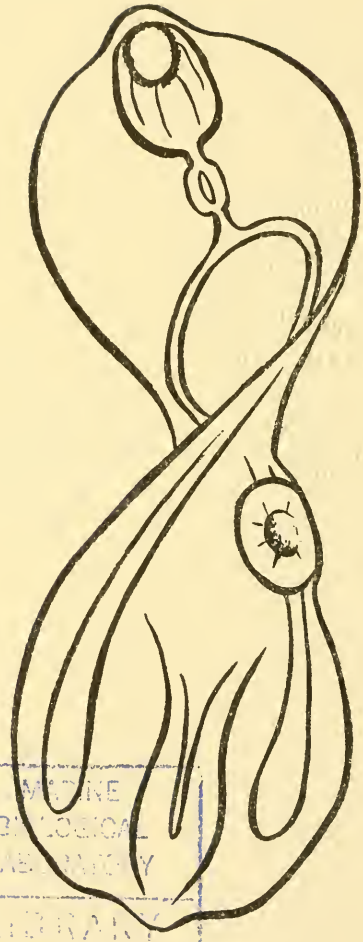

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# Trematodes
## *of the*
## Pacific Northwest
## *An Annotated Catalog*

# Introduction

No single work exists in which the trematode information of the Pacific Northwest has been gathered together. For those who deal with the parasites, their hosts, or the diseases of domestic and game forms, such a work will greatly reduce the time that must be spent in searching. Much of the information has previously been sought out in this laboratory; therefore, it seemed desirable to complete and publish a catalog. This monograph is the result. In it are included all records of trematodes from the Pacific Northwest with notes about each species, whenever additional information exists.

The authors are primarily interested in the digenetic trematodes and the original plan was to catalog only that group. However, much monogenetic trematode information is included in the same literature; the list of known monogenetic trematodes is relatively short; so it seemed advisable to extend our work to include this group.

Also, the catalog was to be limited to parasites of the state of Oregon, but further reflection encouraged us to include the entire Pacific Northwest; *i. e.* Washington, Oregon, Idaho, and British Columbia. There were several reasons for this decision. Political subdivisions are readily utilized because the borders are clearly defined and understood and because distributional records are reported by political areas. This area by reason of climate and drainages constitutes a fairly distinct zoogeographical region.

The decision to eliminate California was based on several considerations: first, the fact that little is known of the trematode fauna of Northern California, especially in the area close to the Oregon border. Ingles (1936) considered the trematodes of amphibians of Northern California and Haderlie (1953) the trematodes of fishes of Northern California; but with the exception of these and a few short papers, nothing is known of the trematode fauna. Furthermore, the centers of trematode research have been in Berkeley, Stockton, and Dillon Beach, several hundred miles from Oregon; and trematode records tend to be concentrated in those areas. Many of the older records are listed only by state (or territory) and records from Southern California are not easily separated from those near the Oregon border. Furthermore, the trematode fauna of Southern California is quite different from that of the Pacific Northwest. Therefore, we have not included any California records.

Idaho was included because the center of trematode research, the University of Idaho at Moscow, is located only three miles from the Washington state line. Many of the trematodes reported from Idaho have also been reported from Washington, Oregon, and British Columbia.

For British Columbia and Washington an almost identical marine trematode fauna has been reported. This, of course, is due to the close proximity of the areas of trematode research; Friday Harbor in the San Juan Islands of Washington, Nanaimo on Vancouver Island, and Vancouver on the mainland of British Columbia, all within 60 miles of each other.

The literature for the trematodes of the Pacific Northwest is centered around a few individuals and laboratories. From British Columbia the major contributions have come from the Laboratory of the Fisheries Research Board of Canada at Nanaimo and the University of British Columbia. McFarlane and later Margolis have made major contributions from the former research center, and Cowan and Adams and their students from the latter. From Washington the major contributions have come from the University of Washington and its Friday Harbor laboratories, from Guberlet and his students, and from Lynch. In Idaho the work has come from the University of Idaho under the leadership of Schell. From Oregon, work has been centered in Portland and Corvallis. In Portland Macy and his students have made contributions from Reed College, and later from Portland State College. From Corvallis at Oregon State University the earlier reports came from the Department of Veterinary Medicine under the leadership of Simms and later Shaw, and the more recent reports have come from the Zoology Department from Pratt, his students, and associates.

In compiling this catalog a number of general references were used to establish synonymies, ranges, life histories, and general biology. Among these are the recent works of Yamaguti (1958), Skrjabin (1947-1958), Manter (1947, 1954), Dawes (1946, 1947), Winter (1955), and Sproston (1946). In general the synonymies in these works have been accepted unless there was general disagreement.

Additional papers on the trematodes of the Northwest are scattered in many journals and are cited in the body of the text where they are pertinent. A few papers are not cited in the body of the text, but are included in the bibliography. These include the papers of Davis (1957) and Deforest (1958) who reported the incidence of trematode infection in the snails of Eastern Washington, and the paper of Jarcho and Burkalow (1952) which surveys schistosome dermatitis. None of these papers mentions the species of trematode involved.

The general plan of this monograph is to include a complete list of the monogenetic and digenetic trematodes of the area, arranged alphabetically by families. Under each species is included its synonymy; a complete list of Pacific Northwest host records, as well as an indication of other areas in which the trematode is found; comments about the taxonomy, if there is a disagreement, or if other problems appear to need clarification; citations of descriptions other than the original to which the reader might look for additional information, and figures to which he might refer if the original description was not readily available; and finally comments on the general biology, life history, distribution, or other facts which are known.

A taxonomically arranged list of hosts and their naturally occurring parasites is also included. Synonyms of hosts are given if parasites have been reported from them by obsolete names. The names of hosts have been taken from several sources. Fish names have been taken from Clemens and Wilby (1949) and Carl, Clemens, and Lindsey (1959). Professor R. E. Dimmick

of the Department of Fish and Game Management, Oregon State University, has also aided in the preparation of the fish host list. Amphibian and reptilian names are from Schmidt (1953). Bird names are from the American Ornithological Union Checklist (1959). Mammalian names are from Hall and Kelson (1959). Marine molluscan names have come from Abbott (1954). Fresh water molluscs in general follow the names of Ward and Whipple (1959) and Henderson (1929). Other invertebrate names are after Smith et al. (1954) and Ward and Whipple (1959).

The bibliography is alphabetically arranged and includes all papers cited in the catalog as well as a few additional papers from the Pacific Northwest which deal with treatment, diagnosis, or other aspects of trematode parasitism, but do not add new host or distribution records.

Unpublished theses and dissertations include many new distributional and host records. Many of these will subsequently be published, but others will not. To prevent a complete loss of these unpublished records, we are appending a list of them at the end of our bibliography.

The index is an attempt to list all scientific and common names that appear in the text of the paper.

A number of new host and distributional records are included and are indicated by an asterisk (*) instead of a bibliographic reference—followed by the county or counties where found. No attempt has been made to analyze the fauna critically or to make new synonymies. This catalog is a noncritical compilation of the published information that is available. Neither descriptions nor figures are included.

The investigation was supported by a research grant, E 867, from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, United States Public Health Service.

# Monogenetic Trematodes

## Family ACANTHOCOTYLIDAE

### *Acanthocotyle pugetensis* Guberlet, 1937

| | | | |
|---|---|---|---|
| Host: | *Raja binoculata* | Wash. | Guberlet, 1937<br>Bonham & Guberlet, 1938 |

There are no other records.

Taxonomy: This species was named by Guberlet (1937) but described by Bonham and Guberlet (1938). Sproston (1946) is in error with Guberlet's date as 1936. Both Sproston and Winters (1955) accept Guberlet as the author even though the species was not described until later.

### *Acanthocotyle pacifica* Guberlet, 1937

| | | | |
|---|---|---|---|
| Hosts: | *Raja binoculata* | Wash. | Guberlet, 1937; Bonham & Guberlet, 1938 |
| | *Raja stellulata* | Wash. | Bonham & Guberlet, 1938 |
| | *Raja rhina* | Wash. | Bonham & Guberlet, 1938 |

There are no other records.

Taxonomy: The same comments apply here as to *A. pugetensis*.

## Family CAPSALIDAE

### *Benedenia hendorffi* (Linstow, 1889) Odhner, 1905

Synonyms: *Phylline hendorffi* Linstow, 1889
*Epibdella hendorffi* Monticelli, 1891

Price (1938) listed this parasite from an unidentified host from Spokane, Washington. It has also been reported from Europe (Linstow, 1889), Chile (Price, 1939a), and California (Heath, 1902).

### *Entobdella squamula* (Heath, 1902) Johnson, 1929

Synonyms: *Epidella squamula* Heath, 1902
*Phyllonella squamula* MacCallum, 1927

| | | | |
|---|---|---|---|
| Hosts: | *Hippoglossus stenolepis* | Alaska to Calif. | Guberlet, 1937 |
| | *Paralichthys californicus* | Alaska to Calif.† | Guberlet, 1937; Heath, 1902 |
| | *Sebastodes* spp. | Alaska to Calif. | Guberlet, 1937; Heath, 1902 |

†This may not be a Northwest record since this fish is not known to occur north of the California border. This parasite has also been reported from the Gulf of Mexico (Price, 1939a).

Morphology: The morphology of this worm has been compared to that of other members of the genus by Ronald (1957).

***Megalocotyle marginata* Folda, 1928**

Synonym: *Trochopos marginata* (Folda, 1928) Price, 1936

| | | | |
|---|---|---|---|
| Hosts: | *Sebastodes nebulosus* | Wash. | Folda, 1928 |
| | *Sebastodes maliger* | Wash. | Bonham, 1950 |
| | *Sebastodes caurinum* | Wash. | Bonham, 1950 |
| | *Sebastodes melanops* | Wash. | Bonham, 1950 |

The only other report of this parasite is from Alaska from two species of *Sebastodes* (Bonham, 1950).

***Megalocotyle trituba* Pratt and Aldrich, 1953**

| | | | |
|---|---|---|---|
| Hosts: | *Sebastodes paucispinus* | Ore. | Pratt & Aldrich, 1953 |
| | *Sebastodes alutus* | Ore. | *Lincoln Co. |
| | *Sebastodes diploproa* | Ore. | *Lincoln Co. |
| | *Sebastodes pinniger* | Ore. | *Lincoln Co. |
| | *Sebastodes ruberrimus* | Ore. | *Lincoln Co. |

This parasite has not been reported outside of the Pacific Northwest.

## Family CHIMAERICOLIDAE

***Chimaericola leptogaster* (Leuckart, 1830) Brinkmann, 1942**

Synonym: *Octobothrium leptogaster* Leuckart, 1830

| | | | |
|---|---|---|---|
| Host: | *Hydrolagus collei* | Wash. | Bonham, 1950 |

Sproston (1946) listed records of this form from *Chimaera monstrosa* from the North and Mediterranean seas.

## Family DACTYLOGYRIDAE

***Dactylogyrus anchoratus* (Dujardin, 1845) Wagener, 1857**

Synonym: *Gyrodactylus anchoratus* Dujardin, 1845

| | | | |
|---|---|---|---|
| Host: | *Cyprinus carpio* | B.C. | Monaco & Mizelle, 1955 |

This parasite has been reported from a number of cyprinids from Europe (Sproston, 1946; Kastak, 1956). In North America it has been reported from New York (Mueller, 1936). This would appear to be a European species that was brought over with the host.

***Dactylogyrus banghami* Mizelle and Donahue, 1944**

| | | | |
|---|---|---|---|
| Hosts: | *Richardsonius balteatus* | B.C. | Monaco & Mizelle, 1955 |
| | *Rhinichthys cataractae* | B.C. | Monaco & Mizelle, 1955 |
| | *Couesius plumbeus* | B.C. | Monaco & Mizelle, 1955 |

This has also been reported from Ontario (Mizelle and Donahue, 1944).

Morphology: Redescribed by Monaco and Mizelle (1955).

* Asterisks denote new (previously unpublished) records of the parasite in the area.

***Dactylogyrus columbiensis*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Host: | *Ptychocheilus oregonensis* | B.C. | Monaco & Mizelle, 1955 |

***Dactylogyrus extensus*** **Mueller and Van Cleave, 1932**

| | | | |
|---|---|---|---|
| Host: | *Cyprinus carpio* | B.C. | Monaco & Mizelle, 1955 |

This form has been reported from New York (Mueller and Van Cleave, 1932) and Oklahoma (Roberts, 1957).

Morphology: Additional by Mueller, 1936.

***Dactylogyrus mylocheilus*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Hosts: | *Mylocheilus caurinum* | B.C. | Monaco & Mizelle, 1955 |
| | *Couesius plumbeus* | B.C. | Monaco & Mizelle, 1955 |

***Dactylogyrus ptychocheilus*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Host: | *Ptychocheilus oregonensis* | B.C. | Monaco & Mizelle, 1955 |

***Dactylogyrus richardsonius*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Host: | *Richardsonius balteatus* | B.C. | Monaco & Mizelle, 1955 |

***Dactylogyrus tridactylus*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Host: | *Ptychocheilus oregonensis* | B.C. | Monaco & Mizelle, 1955 |

***Dactylogyrus vancleavei*** **Monaco and Mizelle, 1955**

| | | | |
|---|---|---|---|
| Hosts: | *Ptychocheilus oregonensis* | B.C. | Monaco & Mizelle, 1955 |
| | *Acrocheilus alutaceum* | B.C. | Monaco & Mizelle, 1955 |

## Family DISCOCOTYLIDAE

***Discocotyle salmonis*** **Schaffer, 1916**

| | | | |
|---|---|---|---|
| Hosts: | *Prosopium williamsoni* | B.C. | Bangham & Adams, 1954 |
| | *Salvelinus malma* | B.C. | Bangham & Adams, 1954 |

This trematode has been reported from New York by Schaffer (1916). Price (1943) reviewed the genus.

***Octomacrum lanceatum*** **Mueller, 1934**

Synonym: *Octobothrium sagittatum* Wright, 1879, *nec* Leuckart, *nec.* Olsson

| | | | |
|---|---|---|---|
| Hosts: | *Catostomus macrocheilus* | Idaho | Fritts, 1959 |
| | *Catostomus macrocheilus* | B.C. | Bangham & Adams, 1954 |
| | *Catostomus catostomus* | B.C. | Bangham & Adams, 1954 |
| | *Mylocheilus caurinum* | B.C. | Bangham & Adams, 1954 |

This parasite has also been reported from New York by Mueller (1934).

***Octomacrum*** **sp.**

Octomacrum sp. has been reported from *Richardsonius balteatus* and *Couesius plumbeus* from British Columbia (Bangham and Adams, 1954).

## Family GYRODACTYLIDAE

### *Gyrodactylus couesius* Wood and Mizelle, 1957

| | | | |
|---|---|---|---|
| Host: | *Couesius plumbeus* | B.C. | Wood & Mizelle, 1957 |

This form has not been reported elsewhere.

### *Gyrodactylus elegans* Nordmann, 1832

Synonym: *Gyrodactylus japonicus* Kikuchi, 1929 (Yamaguti, 1940)

| | | | |
|---|---|---|---|
| Hosts: | *Salmo gairdnerii* | Wash. | Guberlet, Hansen, & Kavanaugh, 1927 |
| | *Gasterosteus aculeatus* | (Experimentally) | Hansen & Kavanaugh |
| | *Salmo clarkii* | Wash. | Wood & Mizelle, 1957 |
| | *Gasterosteus cataphractus* | Wash.† | Guberlet, 1937 |
| | *Salmo trutta* | Wash. | Wood & Mizelle, 1957 |
| | *Ophiodon elongatus* | Wash. | Guberlet, 1937 |
| | *Salvelinus fontinalis* | Wash. | Wood & Mizelle, 1957 |
| | *Sebastodes* spp. | Wash. | Guberlet, 1937 |

†*Gasterosteus cataphractus* does not occur in the Pacific Northwest and is probably reported in error. It is assumed that this should be *G. aculeatus.*

Sproston (1946) listed many records from Europe. Seamster (1938) and Mueller (1936) reported this form from elsewhere in the United States. It has also been reported from Japan (Kikuchi, 1929). *Gyrodactylus elegans* is considered an important pathogen of fish especially in hatcheries. Mizelle (1938) reviewed the literature of the family and control of epidemics.

### *Gyrodactylus* sp.

Griffith (1953) reported *Gyrodactylus* sp. from *Catostomus columbianus palouseanus* from Washington; Shaw, Simms, and Muth (1934) reported it from *Salmo gairdnerii* from Oregon; and Shaw (1933) reported it from hatcheries in Oregon.

## Family HEXABOTHRIIDAE

### *Rajonchocotyle batis* Cerfontaine, 1899

Synonyms: *Rajonchocotyle ovata* Guberlet, 1937
*Rajonchocotyle wehri* Price, 1942

| | | | |
|---|---|---|---|
| Hosts: | *Raja binoculata* | Wash. | Guberlet, 1937; Bonham, 1950 |
| | *Raja stellulata* | Wash. | Price, 1942 |

Cerfontaine (1899) reported this worm from *Raja batis* from Europe. Winters (1955) considered *R. ovata* and *R. wehri* to be synonyms of *R. batis* although Sproston (1946) had not done so.

***Squalonchocotyle somniosi* (Causey, 1926) Guberlet, 1933**

Synonym: *Onchocotyle somniosi* Causey, 1926

| Host: | *Somniosus microcephalus* | Calif. to Alaska | Guberlet, 1937 |
|---|---|---|---|

Causey (1926) reported this form from Alaska.

***Squalonchocotyle abbreviata* (Olsson, 1876) Cerfontaine, 1899**

Synonyms: *Onchocotyle abbreviata* Olsson, 1876
*Onchocotyle striata* Miller, 1927
*Erpocotyle striata* (Miller, 1927) Price, 1942
*Erpocotyle abbreviata* (Olsson, 1876) Price, 1942

| Host: | *Squalus suckleyi* | Wash. | R. C. Miller, 1927; Guberlet, 1932a, 1937; Bonham, 1950 |
|---|---|---|---|

This form has also been reported from Europe by Olsson (1876), and the Siberian Pacific by Layman (1930). Slinn (1957) reported it as *Erpocotyle abbreviata* from Great Britain.

***Squalonchocotyle grisea* Cerfontaine, 1899**

Synonyms: *Onchocotyle appendiculata* Taschenberg, 1879
*Neocrpocotyle grisea* (Cerfontaine, 1899) Price, 1942

| Host: | *Hexanchus griseus* | Wash. | Bonham, 1950 |
|---|---|---|---|

This form has been reported from the Mediterranean by Cerfontaine (1899), Stossich (1898), and Taschenberg (1879). Rees and Llewellen (1941) reported it from Ireland.

## Family MICROCOTYLIDAE

***Microcotyle chiri* Goto, 1894**

| Host: | *Hexagrammos decagrammos* | Wash. | Bonham, 1950 |
|---|---|---|---|

Other hosts have been reported from Japan (Goto, 1894).

***Microcotyle sebastis* Goto, 1894**

| Hosts: | *Sebastodes maliger* | Wash. | Bonham & Guberlet, 1937 |
|---|---|---|---|
| | *Sebastodes melanops* | Wash. | Bonham & Guberlet, 1937 |
| | *Sebastodes melanops* | Ore. | *Lincoln Co. |
| | *Sebastodes caurinus* | Wash. | Guberlet, 1937 |
| | *Ophiodon elongatus* | Wash. | Guberlet, 1937 |

This form has also been reported from Japan (Goto, 1894; Yamaguti, 1934).

***Microcotyle* sp.**

*Microcotyle* sp. has been reported from *Radulinus asprellus* from Washington by Bonham (1950).

Tripathi (1956) included a key to the genera of *Microcotylidae*.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

## Family MONOCOTYLIDAE

***Merizocotyle pugetensis* Kay, 1942**

Host: *Raja binoculata* Wash. Kay, 1942; Bonham, 1950

There are no other records.

## Family POLYSTOMATIDAE

***Polystomoides coronatus* (Leidy, 1888) Price, 1939**

Synonyms: *Polystoma coronatum* Leidy, 1888
*Polystoma opacum* Stunkard, 1916
*P. (Polystomoides) coronatum* Ward, 1917
*Polystoma megalocotyle* Stunkard, 1916
*Polystoma microcotyle* Stunkard, 1916
*Polystomoides megalocotyle* (Stunkard, 1916) Stunkard, 1924
*Polystoma albicollis* MacCallum, 1918
*Polystoma digitatum* MacCallum, 1918

This synonymy is after Sproston (1946).

Host: *Clemmys marmorata* Ore. Thatcher, 1954

This form has been reported from places in North America outside of the Pacific Northwest by Steward (1914), Stunkard (1916, 1917, 1924), Price (1939b), and Harwood (1932). It has also been reported from Japan by Fukui and Ogata (1939).

***Neopolystoma orbiculare* (Stunkard, 1916) Price, 1939**

Synonyms: *Polystoma orbiculare* Stunkard, 1916
*Polystomoides orbiculare* (Stunkard, 1916) Ozaki, 1935
*Polystoma oblongum* Leidy, 1888, *nec.* Wright, 1879
*Polystoma troosti* MacCallum, 1918
*Polystoma inerme* MacCallum, 1918
*Polystoma elegans* MacCallum, 1918
*Polystoma spinulosa* MacCallum, 1918
*Polystoma aspidonectis* MacCallum, 1918
*Polystoma floridanum* Stunkard, 1924

Synonymy after Sproston (1946).

Host: *Clemmys marmorata* Ore. Thatcher, 1954

Additional hosts have been reported by all of the above authors from turtles from North America, many from aquaria.

## Family UDONELLIDAE

### *Udonella caligorum* Johnston, 1835

Synonyms: *Amphibothrium kroeyeri* Leuckart, 1847
*Udonella lupi* van Beneden & Hesse, 1863
*Udonella merlucii* van Beneden & Hesse, 1863
*Udonella pollachii* van Beneden & Hesse, 1863
*Udonella sciaenae* van Beneden & Hesse, 1863
*Udonella triglae* van Beneden & Hesse, 1863
*Echinella hirudinis* van Beneden & Hesse, 1863
*Pteronella molvae* van Beneden & Hesse, 1863
*Udonella caligarum* Taschenberg, 1879
*Podarcella cancerillae* Giard, 1889
*Nitzchia papillosa* Linton, 1898
*Lintonia papillosa* (Linton, 1898) Monticelli, 1904
*Udonella socialis* Linton, 1910
*Calinella myliobati* Guberlet, 1937

Host: *Caligus* sp. on *Raja binoculata* Wash. *San Juan Co.

Guberlet (1937) reported this form on other hosts from California. Sproston (1946) included reports from most of Europe and from Florida. The following copepods were included by Sproston (1946) as known hosts of this form: ***Caligus*** sp., *Anchorella* sp., *Cancerilla tabulata, "Argulus* sp.," *Alebion carchariae, Trebius caudatus, Caligus curtis, C. centrodonti,* and *C. labracis.*

### *Udonella ophiodontis* (Kay, 1945) Winter, 1955

Synonym: *Calinella ophiodontis* Kay, 1945

Host: *Lepeophtheirus* sp. on
*Ophiodon elongatus* Wash. Kay, 1945

This form has not been reported elsewhere.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

# Digenetic Trematodes

## Family ACANTHOCOLPIDAE

### *Stephanostomum casum* (Linton, 1910) McFarlane, 1934

Synonyms: *Stephanochasmus casum* Linton, 1910
*Lechradena edentula* Linton, 1910
*Stephanostomum edentula* (Linton, 1910) Yamaguti, 1953

| | | | |
|---|---|---|---|
| Hosts: | *Sebastodes* sp. | B.C. | McFarlane, 1934 |
| | *Ophiodon elongatus* | B.C. | McFarlane, 1936 |

Also reported from Mexico (Bravo-Hollis, 1956), Florida (Linton, 1910; Manter, 1947), Japan (Yamaguti, 1934) and North Carolina (Manter, 1931).

Morphology: This form was described and figured by McFarlane (1934, 1936) and Manter, (1947). Nothing is known of the life history of this form.

### *Stephanostomum tristephanum* McFarlane, 1936

| | | | |
|---|---|---|---|
| Hosts: | *Ophiodon elongatus* | B.C. | McFarlane, 1936 |
| | | Wash. | McFarlane, 1936; Ching, 1960b |

This form has not been reported elsewhere.

## Family ACCACOELIIDAE

### *Accacladocoelium macrocotyle* (Diesing, 1858) Odhner, 1928

Synonyms: *Distoma macrocotyle* Diesing, 1858
*Podocotyle macrocotyle* (Diesing, 1858) Stossich, 1898

| | | | |
|---|---|---|---|
| Host: | *Mola mola* | Ore. | *Pacific Ocean off Newport |

Other records from Massachusetts (Linton, 1913), Ireland, Scandinavia, Mediterranean area, and North America according to Yamaguti (1958). Nothing is known of the life history.

### *Odhnerium calyptrocotyle* (Monticelli, 1893) Yamaguti, 1934

Synonyms: *Distoma calyptrocotyle* Monticelli, 1893
*Mneidodhneria calyptrocotyle* (Monticelli, 1893) Dollfus, 1935
*Accocoelium calyptrocotyle* (Monticelli, 1893) Luhe, 1900
*Orophocotyle calyptrocotyle* (Monticelli, 1893) Looss, 1902
*Distomum foliatum* Linton, 1898 (Yamaguti, 1953)
*Orophocotyle foliata* (Linton, 1898) Looss, 1902
*Mneiodhneria foliata* (Linton, 1898) Dollfus, 1935

| | | | |
|---|---|---|---|
| Host: | *Mola mola* | B.C. | Lloyd, 1938 |

Additional hosts include *Beröe ovata* from Naples (Monticelli, 1893) and *Mola mola* from Japan (Yamaguti, 1934) and New Zealand (Manter, 1954). Nothing is known of the life cycle.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

## Family ALLOCREADIIDAE

### *Allocreadium lobatum* Wallin, 1909

| | | | |
|---|---|---|---|
| Hosts: | *Salmo gairdneri kamloops* | B.C. | Bangham & Adams, 1954 |
| | *Catostomus catostomus* | B.C. | Bangham & Adams, 1954 |
| | *Prosopium williamsoni* | B.C. | Bangham & Adams, 1954 |
| | *Ptychocheilus oregonensis* | B.C. | Bangham & Adams, 1954 |
| | *Couesius plumbeus* | B.C. | Bangham & Adams, 1954 |
| | *Mylocheilus caurinum* | B.C. | Bangham & Adams, 1954 |

Additional hosts have been reported from New York (Mueller, 1934), Maine (Wallin, 1909), Wisconsin (Pearse, 1924; Fischthal, 1950), Delaware (Hunninen, 1936), Quebec (Bangham and Venard, 1946), Wyoming (Bangham, 1951).

Morphology: Mueller (1934) partially described this form.

Biology: The life history of this form is not known, but that of another species in this genus has been worked out by Seitner (1951).

### *Bunodera eucaliae* (Miller, 1936) Miller, 1940

Synonym: *Bunoderina eucaliae* Miller, 1936

| | | | |
|---|---|---|---|
| Hosts: | *Gasterosteus aculeatus* | B.C. | Bangham & Adams, 1954 |
| | *Eucalia inconstans* | B.C. | Bangham & Adams, 1954 |
| | *Gasterosteus aculeatus* | Ore. | *Benton County |

Additional hosts have been reported from Maine (Mueller, 1936), Wisconsin (Bangham, 1944), and Lake Huron (Bangham, 1955).

Morphology: The only description is the original one by Miller (1936).

Biology: Hoffman (1955) has worked out the life cycle but has not proved it experimentally. The cercariae develop in a clam of the genus *Pisidium* and do not require a second intermediate host.

### *Crepidostomum cornutum* (Osborn, 1903) Stafford, 1904

Synonyms: *Bunodera cornuta* Osborn, 1903
*Distomum nodulosum* (Zeder, 1800) Wright, 1884
*Distomum auritus* MacCallum, 1918 (?) Hopkins, 1934

| | | | |
|---|---|---|---|
| Host: | *Gasterosteus aculeatus* | Ore. | *Linn County |

Additional hosts have been listed by Hopkins (1934) from Ontario, Michigan, New York, Illinois, Mississippi, Quebec, Ohio, Wisconsin, Alabama, and Louisiana.

Morphology: This form was described in detail by Hopkins (1934) but was not figured in his paper.

Biology: Oculate xiphidiocercariae develop in *Musculium* or *Sphaerium* and encyst in crayfish. Contributions to the life history have been made by Bangham (1926), Hopkins (1933), Abernathy (1937), Ameel (1937), Henderson (1938), Hussey (1941), Parker (1941), and Cheng (1957b). Cheng and James (1960) described some of the embryology.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

***Crepidostomum cooperi* Hopkins, 1931**

Synonyms: *Crepidostomum ambloplitis* Hopkins, 1931 (Hopkins, 1934)
*C. solidum* Van Cleave & Mueller, 1932 (Hopkins, 1934)
*C. fausti* Hunninen & Hunter, 1933 (Hopkins, 1934)

| Hosts: | | | |
|---|---|---|---|
| | *Salvelinus fontinalis* | Ore. | Shaw, Simms, & Muth, 1934 |
| | *S. malma* | Ore. | Shaw, 1947; Shaw, Simms, & Muth, 1934 |
| | *Salmo gairdneri* | Ore. | Shaw, 1933, 1947 |
| | Crayfish and mayflies | Ore. | Shaw, Simms, & Muth, 1934 |

Additional hosts have been reported from Ontario, New York, Maine, Illinois, Louisiana, Mississippi, Oklahoma (Hopkins, 1934), and Quebec (Choquette, 1954).

Morphology: Described and figured by Hopkins (1931, 1934).

Biology: Ocellate xiphidiocercariae develop in species of *Musculium* or *Pisidium* and encyst in nymphs of mayflies or other aquatic insects or crustaceans (Hopkins, 1934; Choquette, 1954).

***Crepidostomum farionis* (O. F. Mueller, 1784) Braun, 1900**

Synonyms: *Fasciola farionis* O. F. Mueller, 1784
*F. truttae* Froelich, 1789
*Distoma laureatum* Zeder, 1800
*Fasciola laureata* (Zeder, 1800) Normann, 1840
*Crossodera laureata* (Zeder, 1800) Cobbold, 1860
*Distoma farionis* (O. F. Mueller, 1784) Blanchard, 1891
*Crepidostomum laureatum* (Zeder, 1800) Braun, 1900
*Stephanophialia transmarina* Nicoll, 1909
*S. laurcata* (Zeder, 1800) Nicoll, 1909
*S. farionis* (O. F. Mueller, 1784) Faust, 1918
*S. vitelloba* Faust, 1918
*Crepidostomum ussuruense* Layman, 1930
*C. vitellobum* (Faust, 1918) Hopkins, 1931

| Hosts: | | | |
|---|---|---|---|
| | *Salmo gairdneri* | Ore. | Shaw, 1947 |
| | | B.C. | Bangham & Adams, 1954 |
| | *Salmo clarkii* | Ore. | *Benton County |
| | | B.C. | Bangham & Adams, 1954 |
| | *S. gairdneri kamloops* | B.C. | Bangham & Adams, 1954 |
| | *Salvelinus fontinalis* | B.C. | Bangham & Adams, 1954 |
| | *S. malma* | B.C. | Bangham & Adams, 1954 |
| | *Oncorhynchus kisutch* | B.C. | Bangham & Adams, 1954 |
| | *O. nerka* | B.C. | Bangham & Adams, 1954 |
| | *O. nerka kennerlyi* | B.C. | Bangham & Adams, 1954 |
| | *Lota lota* | B.C. | Bangham & Adams, 1954 |
| | *Prosopium williamsoni* | B.C. | Bangham & Adams, 1954 |
| | *Thymallus arcticus* | B.C. | Bangham & Adams, 1954 |

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

Bangham and Adams (1954) considered this to be the principal parasite of fresh water fish of British Columbia. Hopkins (1934) summarized the distribution of this form and reported it from most of northern Europe, Siberia, and Great Britian, as well as from Alaska, Montana, Wyoming, and Vermont. Recent workers have reported it from Czechslovakia (Dyk, Lucky, and Valenta, 1954), Wales (Thomas, 1958), Quebec (Bangham and Venard, 1946), Wyoming (Bangham, 1951) and California (Haderlie, 1953). Yamaguti (1958) stated that it had been reported from Morocco but did not cite his reference. This reference is unexpected since all other records are boreal. This is primarily a parasite of salmonid fishes, though a few other hosts have been reported.

Morphology: This form has been redescribed in detail by Hopkins (1934).

Biology: Thomas (1958) discussed the general biology of the species. The life history has been worked out by Brown (1927) and Crawford (1943). Ocellate xiphidiocercariae develop in species of *Pisidium* and encyst in species of mayfly.

***Crepidostomum isotomum*** Hopkins, 1931

Host: *Cottus asper* B.C. Bangham & Adams, 1954

This form has been previously reported only by Hopkins (1931, 1934) from Illinois.

Morphology: Described only by Hopkins (1931, 1934).

Biology: Hopkins (1934) has worked out the life history with admittedly weak evidence and has found ocellate xiphidiocercariae to develop in *Sphaerium* and encyst in mayfly nymphs.

***Crepidostomum* sp.**

Forms reported as *Crepidostomum* sp. have been reported from British Columbia by Bangham and Adams (1954) from *Thymallus arcticus* and *Lota lota*. Shaw (1947) reported *Crepidostomum* sp. from *Salmo clarki* and *Salvelinus fontinalis* from Oregon.

***Plagiocirrus primus* Van Cleave and Mueller, 1932**

Host: *Catostomus macrochcilus* Idaho Fritts, 1959

Reported by Van Cleave and Mueller (1932, 1934) from New York, and has not been reported elsewhere. The description by Van Cleave and Mueller is adequate and figures appear in both the 1932 and 1934 papers.

***Plagiocirrus testeus* Fritts, 1959**

Host: *Catostomus machrocheilus* Idaho Fritts, 1959

This is the only paper which mentioned this species.

***Plagiocirrus* sp.**

Bangham and Adams (1954) reported *Plagiocirrus* sp. from *Catostomus catostomus* from British Columbia.

***Allocreadiidae***

Griffith (1953) reported Allocreadiidae from *Catostomus macrocheilus* from Eastern Washington.

## Family APOROCOTYLIDAE

***Aporocotyle simplex* Odhner, 1900**

| | | | |
|---|---|---|---|
| Hosts: | *Sebastodes* sp. | B.C. | McFarlane, 1936 |
| | *Sebastodes maliger* | Wash. | Ching, 1960b |

This species has previously been reported from Sweden (Odhner, 1900) and the Russian arctic (Skrjabin, 1951).

Morphology: This form was redescribed by McFarlane (1936) and figured and described by Skrjabin (1951). Nothing is known of the life cycle of this genus.

***Sanguinicola klamathensis* Wales, 1958**

| | | | |
|---|---|---|---|
| Host: | *Salmo clarki henshawi* | Ore. | Wales, 1958 |

This is the only record of this trematode.

Biology: Furcocercous cercariae develop in *Flumenicola virens,* penetrate fish, and mature in the veins of the gills. Miracidia being released cause damage to the gills and heavy mortality to fish hosts (Wales, 1958).

## Family AZYGIIDAE

***Otodistomum veliporum* (Creplin, 1837) Stafford, 1904**

Synonyms: *Distoma veliporum* Creplin, 1837
*D. insigne* Diesing, 1850
*Fasciola squali grisei* Risso of Deising, 1850
*D. microcephalum* Band, 1853
*D. cestoides* Beneden, 1870
*D. nigrescens* Olsson, 1876
*Agamodistomum chimerae* Ariola, 1899
*Xenodistomum melanocystis* Stafford, 1904
*Otodistomum cestoides* Beneden of Odhner, 1911
*Cercaria cestoides* Nicoll, 1913
*Otodistomum cestoides* Dollfus, 1937
*O. cestoides pacificum* Dollfus, 1937
*O. veliporum leptotheca* Dollfus, 1937
*O. veliporum veliporum* Dollfus, 1937
*O. veliporum pachytheca* Dollfus, 1937
*O. pristiophori* (Johnstone, 1902) (Probably)
*Distoma pristiophori* (Johnstone, 1902) (Probably)

The above synonymy is after Rees, 1953.

| | | | |
|---|---|---|---|
| Hosts: | *Raja binoculata* | Wash. | Lloyd, 1938 |
| | *Hexanthus griseus* | Wash. | *San Juan County |
| | *Raja binoculata* | Ore. | *Lincoln County |

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

Additional hosts have been summarized by Dollfus, (1937b) but must be examined under the various synonyms as noted above. He listed hosts from the Mediterranean, Norway, France, Canada, New Zealand, Alaska, Sweden, Belgium, Great Britain, Chile, Siberia, and Australia. Nicoll (1915b) listed additional British hosts; Rees (1953) listed hosts from Iceland, and Heller (1949) listed hosts from Canada.

Morphology: Manter (1926) described this worm in great detail.

Biology: The life history is not completely known. The adult, egg, and miricidium were described by Manter (1926), and metacercariae have been found encysted in *Glyptocephalus cynoglossus* and *Chimaera monstrosa*. The definitive host is usually a selachian (Nicoll, 1913; Dollfus, 1937b).

***Otodistomum plicatum* Kay, 1947**

Host: *Hexanthus griseus* Wash. Kay, 1947

There are no other records of this form.

## Family BRACHYLAEMIDAE

***Brachylaime fuscatus* (Rudolphi, 1819)**

Synonyms: *Distoma fuscatum* Rudolphi, 1819
*Harmostomum nicolli* Witenberg, 1925
*H.* (*Harmostomum*) fuscatum Witenberg, 1925
*Harmostomum pellucidum* Werby, 1928
*Bradhylaema pellucidum* (Werby, 1928) Sinitsin, 1931

Host: *Turdus migratorius* Wash. Werby, 1928a

Additional hosts are listed in Yamaguti (1958).

Taxonomy: Kruidenier and Gallicchio (1959) have shown the correct designation of the genus to be *Brachylaime*.

Morphology: Skrjabin (1948) described and figured the worm. Dawes (1946) also described the form.

Biology: The life history has been partially worked out by Joyeaux, Baer, and Timon-David (1934) and by Timon-David (1954) and involves a cercaracum developing in the kidney of *Helix pisana* and becoming an adult in passerine birds.

***Glaphyrostomum propinquum* Braun, 1901**

Synonym: *Glaphyrostomum sanguinolentum* Werby, 1928 (Sinitsin, 1931)

Host: *Opornis tolmiei* Wash. Werby, 1928b

Additional hosts are listed in Yamaguti (1958).

Taxonomy: There is some disagreement as to the correct disposition of Werby's species. Dawes (1946) and Yamaguti (1958) accepted Sinitsin's (1931b) proposal, but Skrjabin (1948) retained Werby's species.

## Family BUCEPHALIDAE

### *Rhipidocotyle elongatum* McFarlane, 1936

| | | | |
|---|---|---|---|
| Hosts: | *Ophiodon elongatus* | B.C. | McFarlane, 1936 |
| | *Ophiodon elongatus* | Wash. | Ching, 1960b |

Biology: The life cycle for this form is not known, but other species in the genus have been shown to have distinctive cercariae which develop in mussels and encyst in the tissues of small fish before reaching the definitive host (Kniskern, 1952).

### *Bucephalopsis ozakii* (Ozaki, 1928) Nagaty, 1937

Synonyms: *Bucephalopsis ovatus* Ozaki, 1928 (Preoccupied by *B. ovatus* Linton, 1900)

| | | | |
|---|---|---|---|
| Hosts: | *Salvelinus malma* | B.C. | Bangham & Adams, 1954 |
| | *Platyichthys stellatus* | Ore. | *Lincoln Co. |
| | *Leptocottus armatus* | Ore. | *Lincoln Co. |

This form has also been described from Korea (Ozaki, 1928).

Biology: The life history of this form is unknown, but the closely related *Bucephalopsis haemianus* has been shown to develop in the oyster, encyst in *Menidia,* and develop to maturity in various fishes (Palombi, 1934).

### *Prosorhynchus squamatus* Odhner, 1905

Synonyms: *Bucephalus crux* Levinsen, 1881
*Prosorhynchus grandis* Lebour, 1908
*Prosorhynchus triglae* Nicoll, 1914

| | | | |
|---|---|---|---|
| Host: | *Enophrys bison* | Ore. | *Lincoln Co. |

Additional hosts have been reported from England by Dawes (1946), Nicoll (1907a, 1910a, 1915b), Arctic Russia by Issaitschikow (1928), and Chubrick (1952), Sweden by Levinsen (1881), and Japan by Ozaki (1924).

Biology: Chubrick (1952) concluded that the cercariae from *Mytilus edulis* and the metacercariae from *Liparis liparis* are the intermediate stages of this form in the Barents Sea; and that sometimes it is progenetic in the liparid.

### *Prosorhynchus scalpellus* McFarlane, 1936

| | | | |
|---|---|---|---|
| Host: | *Scorpaenichthys marmoratus* | B.C. | McFarlane, 1936 |

This species is not reported elsewhere.

Taxonomy: Nagaty (1937) considered this as a synonym of *Prosorhynchus crucibulus.*

Biology: The life history is unknown (see Biology section under *P. squamatus* above).

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

***Prosorhynchus facilis* (Ozaki, 1924) Eckmann, 1932**

Synonyms: *Prosorhynchus apertus* McFarlane, 1936
*Gotonius facilis* Ozaki, 1924

| Hosts: | | | |
|---|---|---|---|
| | *Ophiodon elongatus* | B.C. | McFarlane, 1936 |
| | *Ophiodon elongatus* | Wash. | Ching, 1960b |

Additional hosts reported by Yamaguti (1953).

Morphology: McFarlane (1936) described it as *P. apertus* with figures.

Biology: The life history is unknown (see Biology section of *P. squamatus* above).

## Family CAMPULIDAE

***Campula oblonga* (Cobbold, 1858) Braun, 1900 *nec* Cobbold, 1876**

Synonyms: *Distoma oblongum* (Cobbold, 1858) Braun, 1892
*Distoma (Brachylaimus) oblongum* (Cobb., 1858) Stoss., 1892
*Distomum tenuicolle* Rudolphi, 1819, of Olsson, 1893
*Brachycladium oblongum* (Cobb., 1858) Looss, 1902
*Opisthorchis oblonga* Kowalewski, 1898

| Host: | | | |
|---|---|---|---|
| | *Phocaena vomerina* | Wash. | Ching & Robinson, 1959 |

For other hosts see Yamaguti (1958).

Morphology: Described and figured by Skrjabin (1948) and by Dawes (1946). No life histories are known for this genus.

***Hadwenius nipponicus* Yamaguti, 1951**

| Host: | | | |
|---|---|---|---|
| | *Phocaena vomerina* | Wash. | Ching & Robinson, 1959 |

For other hosts see Yamaguti (1951). Life histories are unknown for this genus.

***Lecithodesmus goliath* (van Beneden, 1858) Odhner, 1905**

Synonym: *Distomum goliath* van Beneden, 1858

| Host: | | | |
|---|---|---|---|
| | *Balaenoptera physalus* | B.C. | Margolis & Pike, 1955 |

For other hosts see Dawes (1946) or Yamaguti (1958).

Morphology: This form has been described and figured by Braun (1902), Odhner (1905), Price (1932a), Dawes (1946), and Skrjabin (1948).

***Lecithodesmus spinosus* Margolis and Pike, 1955**

| Host: | | | |
|---|---|---|---|
| | *Balaenoptera borealis* | B.C. | Margolis & Pike, 1955 |

No life history is known for this genus. There are no other reports of this species.

## Family CLINOSTOMATIDAE

***Clinostomum marginatum* (Rudolphi, 1809)**

Synonyms: See note in Taxonomy below.

| Hosts: | | | |
|---|---|---|---|
| | Birds of the Heron group | Pac. N.W. | Guberlet, 1927 |
| | Larvae in *Mylocheilus caurinus* | B.C. | Bangham & Adams, 1954 |
| | Larvae in *Richardsonius balteatus* | B.C. | Bangham & Adams, 1954 |

Additional host references in Yamaguti (1958), Harmes (1959), and Schwartz (1956).

Taxonomy: This species has not been definitely placed taxonomically. European workers (Dawes, 1946; Skrjabin, 1947d; Jaiswal, 1957) placed this in synonymy with *C. complanatum* (Rudolphi, 1819). Yamaguti (1958) showed the status of the species to be unclear. American workers accepted *C. marginatum* as the valid name as evidenced by continued reports of the species (Kruidenier, 1951; Hollis and Coker, 1949; Cameron, 1945; Bangham and Adams, 1954).

Biology: Furcocercous cercariae with fin folds develop in *Helisoma antrosum* and *H. campanulatum*; metacercariae encyst in many fish and develop to maturity in herons (Hunter and Hunter, 1934, 1935, 1935b; Cameron, 1945). Cameron (1945) also stated that man has been a host elsewhere.

## Family CYCLOCOELIDAE

***Cyclocoelum obscurum* (Leidy, 1887) Harrah, 1922**

Synonym: *Monostomum obscurum* Leidy, 1887

Hosts: Reported from an unknown host from Spokane, Washington, by Harrah, 1922. Additional hosts (Harrah, 1922; Tubangui, 1933).

## Family DICROCOELIIDAE

***Athesmia jolliei* Schell, 1957**

| Host: | | | |
|---|---|---|---|
| | *Falco sparverius* | Idaho | Schell, 1957 |

No other record is known. No life history is known for this genus.

***Brachycoelium salamandrae* (Frölich, 1789) Stiles and Hassell, 1898**

Synonyms: *Fasciola salamandrae* Frölich, 1789
*Distoma salamandrae* Zeder, 1803
*Distoma crassicolle* Rudolphi, 1809
*Distomum flavocinctum* Linstow, 1879
*Brachycoelium crassicolle* (Frölich, 1789) Looss, 1899
*Lecithodendrium crassicolle* (Frölich, 1789) Stossich, 1799
*Brachycoelium hospitale* Stafford, 1903

The above synonymy is after Cheng (1958). Rankin (1938) reduced all the American species to synonymy with this species, but a restudy by Parker (1941) and later by Cheng (1958) indicated that this probably was not correct.

| | | | |
|---|---|---|---|
| Hosts: | *Ensatina eschscholtzi* | Ore. | Lehmann, 1954 |
| | *Taricha granulosa* | Ore. | Lehmann, 1954 |

For other host records see Harwood (1932), Byrd (1937a, 1937b), Cheng (1958), Najarian (1955), and Stafford (1900) as well as the European authors cited in the synonymy.

Morphology: Redescribed and figured by Cheng (1958). Kemnitz (1913) showed it to have 20 chromosomes.

Biology: The life cycle is largely unknown for this genus. See Timon-David (1956, 1957). Cort (1915a) found a worm parasitized with the larvae of a *Gordius* worm.

***Brachylecithum chivosca* (Pratt and Cutress, 1949) Skrjabin & Evranova, 1952**

Synonyms: *Olssoniella chivosca* Pratt & Cutress, 1949
*Lypersomum* (*Brachylecithum*) *chivosca* (Pratt & Cutress, 1949) Jaiswal, 1957

| | | | |
|---|---|---|---|
| Host: | *Hesperiophonia vespertina brooksi* | Ore. | Pratt & Cutress, 1949 |

Not known outside of the Pacific Northwest.

Morphology: Redescribed and figured by Skrjabin and Evranova (1952).

***Brachylecithum idahoensis* Schell, 1957**

| | | | |
|---|---|---|---|
| Host: | *Falco sparverius* | Idaho | Schell, 1957 |

There are no other records.

***Brachylecithum mosquense* (Skrjabin and Issaitchikov, 1927)**

Synonyms: *Oswaldoia mosquense* S. and I., 1927
*Olssoniella mosquense* (S. and I., 1927) Travassos, 1944
*Lypersomum mosquense* (S. and I., 1927) Skrjabin & Evranova, 1952

| | | | |
|---|---|---|---|
| Hosts: | *Turdus migratorius* | Idaho | Schell, 1957 |
| | *Ixoreus naevis naevis* | Idaho | Schell, 1957 |
| | *Turdus migratorius* | Ore. | *Coos County |

Additional host records by Yamaguti, 1958; Skrjabin and Evranova, 1952.

Morphology: Described and figured by Skrjabin and Evranova, 1952. For life histories of other members of this genus see Denton (1945), Jolivet and Theodorides (1950) and Mattes (1955).

***Concinnum burleighi* Schell, 1957**

| | | | |
|---|---|---|---|
| Host: | *Passerella iliaco* | Idaho | Schell, 1957 |

There are no other records. For life histories of other members of this genus see Denton (1944), Patten (1952).

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

*Lutztrema monenteron* (Price and McIntosh, 1935) Travassos, 1941

Synonyms: *Lypersomum monenteron* Price & McIntosh, 1935
*Brachylecithum monenteron* (Price & McIntosh, 1935) Strom, 1940

| Hosts: | | | |
|---|---|---|---|
| | *Turdus migratorius* | Idaho | Schell, 1957 |
| | *Ixoreus naevis naevis* | Idaho | Schell, 1957 |
| | *Pipilo erythophthalmus oregonus* | Wash. | Schell, 1957 |

Additional North American hosts in Yamaguti (1958). Also reported from Europe by Mettrick (1956).

Morphology: Skrjabin and Evranova (1952) redescribed and figured this form. Denton and Byrd (1951) gave the flame cell formula and description. No life history is known for this genus. For life history studies on other species in this genus see Denton and Byrd (1951).

*Paradistomum passerculum* Schell, 1957

| Host: | | | |
|---|---|---|---|
| | *Passerculus sandwichensis alaudinis* | Idaho | Schell, 1957 |

No other records. No life history is known for this genus.

*Platynosomum fastosum* Kossack, 1910

Synonym: *Dicrocoelium lanceolatum* var. *symmetricum* Bayless, 1918 (Yamaguti, 1958)

| Host: | | | |
|---|---|---|---|
| | *Neotoma fuscipes* | Ore. | *Benton County |

Additional hosts in Yamaguti (1958) and Perez Vigueras (1955).

Morphology: Redescribed and figured in Skrjabin and Evranova (1952).

Biology: In Puerto Rico the daughter sporocysts develop in the snail *Subulina octona* and leave the snail as sporocysts, then penetrate a lizard which is eaten by a cat (Maldonada, 1945).

## Family DIPLOSTOMIDAE

*Alaria arisaemoides* Augustine and Uribe, 1927

| Hosts: | | | |
|---|---|---|---|
| | *Canis familiaris* | Ore. | Dikmans, 1945; Price, 1932b |
| | *Felis domesticus* | Ore. | Dikmans, 1945 |

Other hosts from North America in Yamaguti (1958).

Morphology: Redescribed and figured by Dubois (1938).

Biology: Cercariae develop in *Planorbula armigera* and *Promenetus exacuous* and penetrate tadpoles and adults of *Rana pipiens, Rana sylvatica,* and *Bufo americanus.* Diplostomula develop in the lungs of foxes and migrate to the gut to mature—experimentally by Pearson (1956).

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

### *Alaria marcinae* (LaRue, 1917) Walton, 1950

Synonym: *Agamodistomum marcianae* LaRue, 1917

| | | | |
|---|---|---|---|
| Hosts: | *Thamnophis sirtalis* | Wash. | Sumwalt, 1926 |
| | *Thamnophis ordinoides* | Wash. | Sumwalt, 1926 |

In both cases these forms were larval in the snakes. Also reported from *Rana pipiens* by LaRue, 1917.

### *Alaria mustelae* Bosma, 1931

| | | | |
|---|---|---|---|
| Hosts: | *Mustela vison* | Ore. | Senger & Neiland, 1955 |
| | *Mustela frenata* | Ore. | Senger & Neiland, 1955 |

Additional hosts listed by Dubois (1938).

Morphology: Bosma (1934) described the adult and larval stages in detail; these are also described and figured by Dubois (1938).

Biology: Cercariae develop in *Planorbula armigera;* metacercariae in tadpoles and frogs—confirmed experimentally by Bosma (1934).

### *Alaria oregonensis* LaRue and Barone, 1932

| | | | |
|---|---|---|---|
| Host: | *Canis latrans lestes* | Ore. | LaRue & Barone, 1927, 1932 |

Morphology: Described and figured by Dubois (1938).

### *Alaria* sp.

Cram (1926) reported an *Alaria* sp. from a coyote (*Canis latrans lestes*) from Oregon, and Shaw (1947) reported a larval *Alaria* sp. from the Eastern Brook Trout, *Salvelinus fontinalis,* from Oregon.

### *Diplostomum* sp.

Shaw (1947) reported a *Proalaria* sp. from a pelican (*Pelicanus* sp.) *Proalaria* is now considered to be a synonym of *Diplostomum* (Dubois, 1938).

### *Diplostomulum* sp.

*Diplostomulum* is a "generic" name for metacercaria of diplostomid trematodes for which the adult form is unknown and which is unencysted in the intermediate host. Bangham and Adams (1945) reported the following fish hosts of *Diplostomulum* from fresh water of British Columbia:

| | |
|---|---|
| *Prosopium williamsoni* | *Oncorhynchus kisutch* |
| *P. cylindraceum quadrilaterale* | *Salmo clarki* |
| *Catostomus catostomus* | *S. gairdneri kamloops* |
| *C. macrocheilus* | *Salvelinus fontinalis* |
| *C. commersoni* | *S. malma* |
| *Mylocheilus caurinum* | *Couesius plumbeus* |
| *Ptychocheilus oregonensis* | *Richardsonius balteatus* |
| *Gasterosteus aculeatus* | *Lota lota* |
| *Micropterus salmoides* | *Cottus asper* |
| | *Cottus rhotheus* |

### *Neascus* sp.

*Neascus* is a "generic" name for metacercariae of diplostomid trematodes for which the adult form is unknown, is encysted, and lacks lateral suckers. Bangham and Adams (1954) reported the following species of fresh water fish as hosts of *Neascus* in British Columbia:

*Salmo clarkii*
*Salvelinus malma*
*Catostomus macrocheilus*
*Acrocheilus alutaceum*
*Rhinichthys cataractae*
*Richardsonius balteatus*
*Salvelinus fontinalis*
*Catostomus catostomus*
*Mylocheilus caurinum*
*Couesius plumbeus*
*Ptychocheilus oregonensis*
*Micropterus salmoides*
*Lepomis gibbosus*

### *Pharyngostomoides procyonis* Harkema, 1942

Host: *Procyon lotor* Ore. *Location unknown

The only other records are those of Harkema (1942).

### *Posthodiplostomum minimum* (MacCallum, 1921) Dubois, 1936

Synonyms: *Diplostomum minimum* MacCallum, 1921
*Neodiplostomum minimum* (MacCallum, 1921) Dubois, 1935
*Neodiplostomum orchilongum* Noble, 1936
*Posthodiplostomum orchilongum* (Noble, 1936) Dubois, 1937

Hosts: Bangham and Adams (1954) reported the following fresh water fish from British Columbia as hosts for the larval stages of this trematode:

*Catostomus catostomus*
*Mylocheilus caurinum*
*Couesius plumbeus*
*Ptychocheilus oregonensis*
*Gasterosteus aculeatus*
*Lepomis gibbosus*
*Catostomus macrocheilus*
*Acrocheilus alutaceum*
*Rhinichthys cataractae*
*Richardsonius balteatus*
*Lota lota*
*Cottus asper*

More hosts from the Pacific Northwest with larval forms include:

*Catostomus columbianus palouseanus* Wash. Griffith, 1953
*Catostomus macrocheilus* Wash. Griffith, 1953
*Lepomis macrochirus* Wash. Griffith, 1953

Additional hosts have been listed by Dubois (1938), Hoffman (1958).

Morphology: Described and figured by Dubois (1938).

Biology: Miller (1954) showed oculate furcocercous cercariae to develop in *Physa heterostropha,* encyst experimentally in *Lepomis gibbosus* and *L. megalotus,* and develop in chicks. Hoffman (1958) has done additional work on their life history and physiology. He listed an extensive bibliography.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

***Tetracotyle* sp.**

*Tetracotyle* is a "generic" name for metacercariae of diplostomid trematodes which are unencysted, bear a pair of lateral cotylae (suckers), and in which the adult form is unknown. Bangham and Adams (1954) listed the following fresh water fish from British Columbia as hosts of *Tetracotyle:*

| | |
|---|---|
| *Prosopium williamsoni* | *Catostomus catostomus* |
| *Oncorhynchus nerka* | *C. macrocheilus* |
| *Salvelinus malma* | *Mylocheilus caurinum* |
| *Couesius plumbeus* | *Richardsonius balteatus* |
| *Ptychocheilus oregonensis* | *Gasterosteus aculeatus* |
| *Eucalia inconstans* | *Cottus asper* |
| | *Cottus rhotheus* |

***Cercaria* sp.**

Hunter et al. (1949) reported a "strigeid" cercaria from *Lymnaea palustris* from Washington.

## Family ECHINOSTOMATIDAE

***Aporchis continuus* McCauley and Pratt, 1960**

Host: *Larus canus* Ore. McCauley & Pratt, 1960

There are no other records.

***Echinoparyphium contiguum* Barker and Bastron, 1915**

Host: *Ondatra zibethica* B.C. Knight, 1951

Hosts from other areas have been reported by Swales (1933) and Olsen (1938).

Morphology: Redescribed by Knight (1951) and described and figured in Skrjabin and Baschkirova (1956).

***Echinoparyphium recurvatum* (Linstow, 1873) Dietz, 1909**

Synonyms: *Distomum recurvatum* Linstow, 1873
*Echinostomum recurvatum* (Linstow, 1873) Stossich, 1892

Host: "Naturally infected snails" Ore. Senger, 1954

Additional hosts from other areas were listed by Yamaguti (1958).

Morphology: This form was figured and described by Skrajabin and Baschkirova (1956). The embryology and development of the excretory system of the cercariae were described by Kuntz (1953).

Biology: This parasite develops in various snails and the cercariae encyst in the same snail, another snail, or less frequently in some other animal. Gmitter (1955) reported it from *Lymnaea peregra* in Czechoslovakia, Harper (1929) reported it from *Valvata piscinalis,* Mathias (1926, 1927) reported it from various species of *Planorbis, Cyclas,* and *Lymnaea,* and Bittner (1925) showed metacercariae to occur in *Rana temporaria.*

This worm has been shown to cause the death of mute swans in Great Britain (Soulsby, 1955).

***Echinostomum coalitum*** **Barker and Beaver, 1915**

Host: *Ondatra zibethica* B.C. Knight, 1951

This form was also reported from Czechoslovakia by Bartik et al. (1956).

Taxonomy: The description of this species appeared in Barker (1915). However to give credit for unpublished material he included the names of both authors in his paper.

Morphology: Skrjabin and Baschkirova (1956) figured and described this form.

Biology: The life history has been worked out experimentally by Krull (1935a), though natural hosts apparently are unknown for most of the larval stages.

***Echinostomum revolutum*** **(Frőlich, 1802) Looss, 1899**

Synonyms: *Fasciola revoluta* Frőlich, 1802
*Distoma echinatum* Zeder, 1803
*Echinostoma echinatum* (Zeder, 1803) Blainville, 1828
*Distoma (Echinostoma) echinatum* (Zeder, 1803) Dujardin, 1845
*Distomum dilatatum* Miram, 1840
*Distomum armatum* Molin, 1850
*Echinostoma erraticum* Lutz, 1924
*Echinostoma neglectum* Lutz, 1924

This synonymy is after Skrjabin and Baschkirova (1956). Beaver (1937) proposed additional synonymies.

| | | | |
|---|---|---|---|
| Hosts: | *Ondatra zibethica* | Ore. | Rider & Macy, 1947<br>Senger & Neiland, 1955 |
| | *Anas platyrhynchus* | Ore. | *Benton County |
| | *Olor buccinator* | B.C. | Cowan, 1946 |
| | "Naturally infected snails" | Ore. | Senger, 1954 |

Additional hosts from other areas were listed by Yamaguti (1958). The species is cosmopolitan in both birds and mammals.

Morphology: Beaver (1937) monographed this form and described and figured the life stages. Additional figures may be found in Skrjabin and Baschkirova (1956). Redescribed and figured by Perez Vigueras (1956).

Biology: Beaver (1937) in his monograph gave a great deal of information about the life history and general biology. Yamaguti (1958) included a number of references to the biology of this species since Beaver's paper. The life history involves *Cercaria echinata* which develops within a snail host, then encysts either in the same snail, a different snail, or even a clam or tadpole. The definitive host gets the parasite by eating the cysts. This is a parasite of man in some parts of the world and a potential human parasite wherever it occurs.

***Stephanoprora*** **sp.**

Host: Shaw (1947) listed *Stephanoprora* sp. from a gull of Oregon.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

*Cercaria cita* Miller 1929

This echinostome cercaria was described by Miller (1929) from *Planorbis* sp. from Washington. It is of the magnacercous type.

## Family FASCIOLIDAE

*Fasciola hepatica* Linnaeus, 1758

Synonyms: *Distoma hepaticum* Linnaeus, 1758
*Distomum hepaticum* Retzius, 1786
*Planaria latiuscula* Goeze, 1782
*Cladocoelium hepaticum* (Linnaeus, 1758) Stossich, 1892
*Distoma caviae* Sonsino, 1890

| Hosts: | | | |
|---|---|---|---|
| | Sheep | Wash. | Stiles, 1902; Hall, 1912 |
| | Sheep | Ore. | Stiles, 1902; Hall, 1912 |
| | Goat | Wash. | Hall, 1912 |
| | Sheep | Pac. N.W. | Guberlet, 1932a |
| | Cattle | B.C. | Swales, 1933 |
| | Cattle | Ore. | Shaw, 1944 |
| | *Dama hemionus* | B.C. | Swales, 1933 |
| | Sheep | B.C. | Hadwen, 1916; Griffith, 1939; Bruce, 1930 |
| | Sheep | Idaho | Huffman & Dade, 1925 |

For additional information about this well known worm the reader is referred to any of the standard parasitology textbooks such as Belding (1952) or Chandler (1955). Reinhard (1957) recently reviewed the history of the discovery of the life cycle of the liver fluke. Skrjabin (1948) had a bibliography with approximately 375 entries in it on the family Fasciolidae.

Biology: Cercariae develop in redia in various snails, encyst on the vegetation or the surface of the water, and ultimately enter the definitive host. In Oregon the following species of snail have been associated with *Fasciola hepatica: Lymnaea* (=*Galba*) *bulminoides* and *Lymnaea* (=*Galba*) *ferruginea* (Shaw, Muth, and Seghetti, 1939), *Lymnaea trunculata* (OSC Agri. Expt. Sta. Director's Report, 1928). Probably in error since this form is not known in North America.

The following papers deal with *Fasciola hepatica* in the Pacific Northwest; many deal with treatment, pathology, and control; OSC Agri. Expt. Sta. Dir. Rept. 1928; Simms, 1917, 1920; Shaw and Simms, 1927; Shaw, 1932, 1934, 1944; Shaw and Muth, 1942, 1946.

*Fascioloides magna* (Bassi, 1875) Ward, 1917

Synonyms: *Fasciola magna* Bassi, 1875
*Fasciola carioca* Hassall, 1891
*Fasciola americana* Hassall, 1891
*Distomum texanum* Francis, 1891

| | | | |
|---|---|---|---|
| Hosts: | Cattle | Idaho | Dikmans, 1945 |
| | | B.C. | Dikmans, 1945 |
| | Elk | Ore. | Shaw, 1947 |
| | Deer | B.C. | Shaw, 1947; Bruce, 1930 |
| | Buffalo | B.C. | Cowan, 1951 |
| | Mule deer | B.C. | Cowan, 1951 |
| | Coast deer | B.C. | Cowan, 1951 |
| | Moose | B.C. | Cowan, 1951; Bruce, 1930 |
| | Cattle | B.C. | Swales, 1933; Bruce, 1930 |
| | *Dama hemionus* | B.C. | Hadwen, 1916 |

Morgan and Hawkins (1949) discussed this form and gave additional hosts and distribution as well as the life history which is much like *Fasciola hepatica.* Skrjabin (1948) reviewed the morphology and figured the developmental stages but not the adult worm. Slusarski (1955) rejected the genus *Fascioloides* and thought that the name should be *Fasciola magna.* Life history studies on *Fascioloides magna* include those of Campbell and Todd (1954, 1955, 1956), Griffiths (1955), and Wu and Kingscote (1953, 1954).

## Family FELLODISTOMATIDAE

***Fellodistomum brevum* Ching, 1960b**

| | | | |
|---|---|---|---|
| Host: | *Microstomus pacificus* | Wash. | Ching, 1960b |

***Fellodistomum furcigerum* (Olsson, 1868) Yamaguti, 1953**

Synonym: *Steringophorus furciger* (Olss.) Odhner, 1905

| | | | |
|---|---|---|---|
| Host: | *Pleuronichthys decurrens* | Wash. | Ching, 1960b |

## Family GORGODERIDAE

***Phyllodistomum singulare* Lynch, 1936**

| | | | |
|---|---|---|---|
| Host: | *Dicamptodon ensatus* | Ore. | Lynch, 1936 |

Morphology: Redescribed and figured by Pigulevsky, 1953.

***Phyllodistomum staffordi* Pearse, 1924**

Synonyms: *P. carolini* Holl, 1929 (Wu, 1938)
*P. hunteri* (Arnold, 1934) Dawes, 1946
*Catoptroides hunteri* Arnold, 1934

| | | | |
|---|---|---|---|
| Hosts: | *Ictalurus nebulosus* | B.C. | Bangham & Adams, 1954 |
| | *I. melus* | B.C. | Bangham & Adams, 1954 |
| | *I. natalis* | Ore. | *Benton County |
| | *I. nebulosus* | Ore. | *Benton County |

For hosts in areas away from the Pacific Northwest see Pearse (1924), Holl (1929), and Arnold (1934).

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

Morphology: Described and figured by Pigulevsky (1953). While the life history of neither of the two Northwest species has been worked out, a great deal of information about other members of the genus is known. Frandsen (1957), Pande (1937), and Kaw (1950) considered *Gorgoderina* to be a synonym of *Phyllodistomum,* and Dollfus (1958) suggested that these two genera be differentiated on the basis of host class: *Gorgoderina* from the amphibians and *Phyllodistomum* from fish. *Phyllodistomum* life history studies have been made by Beilfus (1954), Shibue (1954), Yamaguti (1958), Crawford (1939), and Goodchild (1943). The genus was reviewed by Nybelin (1926), Holl (1929), Lewis (1935), Wu (1938), Fischthal (1942, 1943), and Meserve (1943). Other contributions to the biology of the genus concern the excretory anatomy by Byrd and Venard (1940), the ecology by Groves (1945) and the embryology by Dhingra (1954).

## Family HEMIURIDAE

### *Aponurus* sp.

Shaw (1947) reported *Aponurus* sp. from *Salvelinus malma* and *Salmo gairdneri* from Oregon.

### *Brachyphallus crenatus* (Rudolphi, 1802) Odhner, 1905

Synonyms: *Fasciola crenata* Rudolphi, 1802
*Distoma crenatum* Rudolphi, 1809, *nec* Rudolphi, 1810, *nec* Molin, 1859
*D. appendiculatum* Rudolphi, 1819, in part
*Distomum ventricosum* Wagener, 1860, in part
*D. ocreatum* Olsson, 1867 *nec* Rudolphi, 1819, *nec* Molin, 1861
*Apoblema ocreatum* Juel, 1899
*A. appendiculatum* Monticelli, 1892, in part, and Mühling, 1898, *nec* Rudolphi, 1802
?*Fasciola serratulata* Mueller, 1780
?*Distoma ocreatum* of Linton, 1900
?*Fasciola salmonis* Mueller, 1780
*Hemiurus ocreatus* (Rudolphi) of Lühe, 1901

The above synonymy is after Dawes (1946).

| | | | |
|---|---|---|---|
| Hosts: | *Salvelinus malma* | B.C. | Bangham & Adams, 1954 |
| | *Oncorhynchus tshawytscha* | Wash. | Lloyd, 1938 |
| | *Oncorhynchus tshawytscha* | Ore. | Shaw, 1947 |

This trematode is known from the Scandinavian arctic (Odhner, 1905), Russian Arctic (Schulman and Schulman-Albova, 1953), England (Nicoll, 1915), Poland (Markowski, 1933), Japan (Yamaguti, 1934), Atlantic Coast of North America (Linton, 1940; Manter, 1926; Lander, 1904).

Morphology: The morphology of this worm has been worked out in great detail by Lander (1904) and again by Lloyd (1938).

Biology: The life histories of this species and other members of the genus are unknown.

### *Derogenes crassus* Manter, 1934

| | | | |
|---|---|---|---|
| Hosts: | *Ophiodon elongatus* | Ore. | McCauley, 1960 |
| | *Sebastodes paucispinus* | Ore. | McCauley, 1960 |

This parasite has been reported from Florida (Manter, 1934), Japan (Yamaguti, 1938) and Tasmania (Crowcroft, 1947).

Morphology: This was described in detail only by Manter (1934). Nothing is known of the life history.

### *Derogenes varicus* (Mueller, 1784) Looss, 1901

Synonyms: *Fasciola varica* Mueller, 1784, of Rudolphi, 1802
*Distoma varicum* Zeder of Rudolphi, 1809
*Distomum dendriticum* Creplin, 1829, in part
*Derogenes varicum* (Mueller, 1784) of Olsson, 1868, and Levinsen, 1881, *nec* Monticelli, 1890

| | | | |
|---|---|---|---|
| Hosts: | *Ophiodon elongatus* | Wash. | Lloyd, 1938 |
| | *Ophiodon elongatus* | Wash. | Ching, 1960b |
| | *Sebastodes maliger* | Wash. | Lloyd, 1938 |
| | *Sebastodes maliger* | Wash. | Ching, 1960b |
| | *Sebastodes caurinus* | Wash. | Ching, 1960b |
| | *Leptocottus armatus* | Wash. | Lloyd, 1938 |
| | *Clinocottus embryum* | Wash. | Ching, 1960b |
| | *Microgadus proximus* | Ore. | McCauley, 1960 |
| | *Gasterosteus aculeatus* | Wash. | Ching, 1960b |
| | *Platichthys stellatus* | Wash. | Ching, 1960b |
| | *Porichthys notatus* | Wash. | Ching, 1960b |
| | *Isopsetta isolepis* | Wash. | Ching, 1960b |

This trematode probably has the largest host list of any trematode of fishes. It has been reported from Europe (Nicoll, 1915b; Tosh, 1905; Rees, 1953; Olsson, 1868; Looss, 1901; Issaitschikow, 1928, 1933; Dogeli and Rosova, 1941; Schulman and Schulman-Albova, 1953; Poljansky, 1955); the East Coast of North America (Stafford, 1904; Miller, 1941; Manter, 1926, 1934; Heller, 1949; Linton, 1940), from the South Atlantic (Szidat, 1955), Japan (Yamaguti, 1953), New Zealand (Manter, 1954), and Galapagos (Manter, 1940).

Taxonomy: Dawes (1946) placed several other species of *Derogenes* in synonymy with *D. varicus* but this was not generally accepted (Manter, 1954; Yamaguti, 1953, 1958).

Morphology: There are adequate morphological descriptions and figures by Odhner (1905), Manter (1926), and Lloyd (1938). Nothing is known of the life history.

### *Derogenes* sp.

Shaw (1947 described *Derogenes* sp. from *Salmo gairdneri* from Oregon. We have examined this form from the same host, from *Salma clarki, Oncorhynchus kisutch,* and *O. tshawytscha* and believe it to be an undescribed species. It will be described elsewhere.

***Genolinea laticauda*** **Manter, 1925**

Synonym: *Genolinea robusta* Lloyd, 1938 (Manter, 1954)

| | | | |
|---|---|---|---|
| Hosts: | *Scorpaenichthys marmoratus* | B.C. | McFarlane, 1936 |
| | *S. marmoratus* | Wash. | Lloyd, 1938 |
| | *Ophiodon elongatus* | Wash. | Lloyd, 1938 |
| | *Leptocottus armatus* | Ore. | McCauley, 1960 |
| | *Enophrys bison* | Ore. | McCauley, 1960 |
| | *Blepsias cirrhosis* | Ore. | McCauley, 1960 |

The only other report of this form was from Maine (Manter, 1925).

***Genolinea manteri*** **Lloyd, 1938**

| | | | |
|---|---|---|---|
| Hosts: | *Leptocottus armatus* | Wash. | Lloyd, 1938 |
| | *Lumpenus sagitta* | Ore. | McCauley, 1960 |
| | *Enophrys bison* | Ore. | McCauley, 1960 |
| | *Dasycottus setiger* | Wash. | Ching, 1960b |

This parasite is unknown outside of the Pacific Northwest. Lloyd (1938) has adequately described the form. Nothing is known of its life history.

***Genolinea montereyensis*** **Annereaux, 1947**

| | | | |
|---|---|---|---|
| Host: | *Leptocottus armatus* | Ore. | McCauley, 1960 |

The only other report of this trematode is that of Annereaux (1947) from California.

***Genolinea oncorhynchi*** **Margolis and Adams, 1956**

| | | | |
|---|---|---|---|
| Host: | *Oncorhynchus gorbuscha* | B.C. | Margolis & Adams, 1956 |

This is the only report of this trematode.

***Halipegus occidualis*** **Stafford, 1905**

Synonym: *Halipegus lermensis* Caballero, 1941 (Caballero, 1948)

| | | | |
|---|---|---|---|
| Hosts: | *Rana aurora* | Ore. | Macy & Demott, 1957; Macy, Cook, & Demott, 1960 |
| | *Tarica torosa* | Ore. | Macy & Demott, 1957; Macy, Cook, & Demott, 1960 |
| | *Dicamptodon ensatus* | Ore. | Macy & Demott, 1957; Macy, Cook, & Demott, 1960 |

This form has been reported from Eastern Canada by Stafford (1904), Maryland by Krull (1935b), and Mexico by Caballero (1941).

Morphology: This form has been described by Krull (1935b) and Macy, Cook, and Demott (1960).

Biology: Krull (1933b, 1935b), Macy and Demott (1957), and Macy, Cook, and Demott (1960) worked out the life cycle experimentally. In Oregon (Macy and Demott, 1957; Macy, Cook, and Demott, 1960) found that cystophorus cercariae develop in *Planorbis trivolvis subcrenatus* and penetrate the ostracod *Cypridopsis vidua* before reaching the definitive host. Krull (1935b) was able to get cercariae to penetrate several species of *Cyclops* and a dragon fly.

***Hemiurus levinseni*** **Odhner, 1905**

Synonyms: *Distoma appendiculatum* Rudolphi in Olsson, 1868, in part
*Distomum appendiculatum* Rudolphi in Levinsen, 1881, in part

| | | | |
|---|---|---|---|
| Hosts: | *Oncorhynchus tshawytscha* | Wash. | Lloyd, 1938 |
| | *O. gorbuscha* | B.C. | Margolis, 1956 |
| | *Sebastodes ruberrimus* | Wash. | Lloyd, 1938 |
| | *S. caurinus* | Wash. | Lloyd, 1938 |
| | *Ophiodon elongatus* | Wash. | Lloyd, 1938 |
| | *Microgadus proximus* | Ore. | McCauley, 1960 |
| | *Theragra chalcogramma* | Wash. | Ching, 1960b |

This form has also been reported from Europe (Nicoll, 1915; Issaitschikow, 1928, 1933; Schulman and Schulman-Albova, 1953; Poljansky, 1955); from the Far East (Layman, 1930); Arctic Atlantic (Dollfus, 1923; Odhner, 1905); Atlantic coast of North America (Cooper, 1915; Linton, 1940; Heller, 1949; Manter, 1925, 1926).

Morphology: Manter (1926) and Odhner (1905) adequately described this form.

Biology: Myers (1956) reported a mature hemiurid resembling *H. levinseni* in the intestine of *Sagitta elegans* from New Brunswick. She suggested that *Sagitta* feeds on the same plankton as the small fish hosts which are also heavily infected.

***Intuscirrus aspicotti*** **Acena, 1947**

| | | | |
|---|---|---|---|
| Host: | *Enophrys bison* | Wash. | Acena, 1947 |

This form has been reported only in this one paper and is unknown elsewhere.

***Lecithaster salmonis*** **Yamaguti, 1934**

| | | | |
|---|---|---|---|
| Hosts: | *Oncorhynchus tshawytscha* | Wash. | Lloyd, 1938 |
| | *Salvelinus malma* | B.C. | Bangham & Adams, 1954 |
| | *Oncorhynchus nerka* | B.C. | Bangham & Adams, 1954 |
| | *Oncorhynchus kisutch* | Wash. | Ching, 1960b |
| | *Sebastodes maliger* | Wash. | Ching, 1960b |
| | *Sebastodes melanops* | Wash. | Ching, 1960b |
| | *Leptocottus armatus* | Wash. | Ching, 1960b |
| | *Clinocottus embryum* | Wash. | Ching, 1960b |
| | *Gasterosteus aculeatus* | Wash. | Ching, 1960b |
| | *Cymatogaster aggregata* | Wash. | Ching, 1960b |
| | *Porichthys notatus* | Wash. | Ching, 1960b |

Additional hosts were reported by Yamaguti (1934, 1940, 1951) from Japan.

Biology: The life history is unknown, but Hunninen and Cable (1941, 1943b) worked out the life history of the closely related *L. confusus*.

***Lecithaster*** **sp.**

Shaw (1947) reported *Lecithaster* sp. from the chinook salmon *Oncorhynchus tshawytscha* from Oregon.

***Lecithochirium* exodicum McFarlane, 1936**

Synonyms: *Sterrhurus magnatestis* Park, 1936
*Lecithochirium medium* Acena, 1941
*Sterrhurus exodicus* (McFarlane, 1936) Yamaguti, 1958
*Adinosoma exodica* (McFarlane, 1936) Skrjabin & Guschanskaja, 1955
*Dissosaccus medius* (McFarlane, 1936) Skrjabin & Guschanskaja, 1955
*Lecithochirium magnatestis* (Park, 1936) Skrjabin & Guschanskaja, 1955

| Hosts: | | | |
|---|---|---|---|
| | *Ophiodon elongatus* | B.C. | McFarlane, 1936 |
| | *Ophiodon elongatus* | Wash. | Lloyd, 1938; Ching, 1960b |
| | *Ophiodon elongatus* | Wash. | *Neah Bay, Wash., San Juan Islands, Wash. |
| | *Ophiodon elongatus* | Ore. | McCauley, 1960 |
| | *Eopsetta jordani* | Ore. | Gregoire & Pratt, 1952 |
| | *Platyichthys stellatus* | Wash. | Ching, 1960b |
| | *Sebastodes ruberrimus* | Wash. | Acena, 1941 |
| | *Sebastodes maliger* | Wash. | Lloyd, 1938; Ching, 1960b |

The only other record of this parasite is by Park (1936) from California.

Morphology: The description by Lloyd (1938) is adequate.

Biology: The life history of the species is unknown. Lloyd (1938) found the worm commonly at Friday Harbor, Washington; in *Ophiodon elongatus,* but was unable to find it in the same host 70 miles away at Seattle, Washington.

***Lecithochirium* sp.**

Lloyd (1938) reported *Lecithochirium* sp. from the ctenophore *Bolinopsis microptera* from Washington.

***Lecithophyllum anteroporum* Margolis, 1958**

| Hosts: | | | |
|---|---|---|---|
| | *Merluccius productus* | B.C. | Margolis, 1958 |
| | *Oncorhynchus nerka* | B.C. | Margolis, 1958 |
| | *O. gorbuscha* | B.C. | Margolis, 1958 |

There are no other reports of this species. Nothing is known of the life cycle.

***Parahemiurus merus* (Linton, 1910) Woolcock, 1935**

Synonyms: *Hemiurus merus* Linton, 1910
*Parahemiurus platyichthyi* Lloyd, 1938
*P. parahemiurus* Vaz & Pereira, 1930
*P. atherinae* Yamaguti, 1938
*Parahemiurus harengulae* Yamaguti, 1938

| Hosts: | | | |
|---|---|---|---|
| | *Platyichthys stellatus* | Wash. | Lloyd, 1938 |
| | *Gasterosteus aculeatus* | Wash. | Ching, 1960b |

Additional hosts have been reported from Florida by Manter (1947) and Linton (1910); South America by Manter (1940) and Vaz & Pereira (1930); Japan by Yamaguti (1938); and Bimini by Soganderes-Bernal (1959).

Morphology: This worm has been described many times, but the descriptions by Manter (1940) and Lloyd (1938) are the most useful. Nothing is known of the life history.

### *Tubulovesicula lindbergi* (Layman, 1930) Yamaguti, 1934

Synonyms: *Lecithaster lindbergi* Layman, 1930
*Lecithurus lindbergi* (Layman, 1930) Piguelevsky, 1938
*Dinurus nanaimoensis* McFarlane, 1936
*Tubulovesicula spari* Yamaguti, 1934
*T. muraenosocis* Yamaguti, 1934
*T. californica* Park, 1938
*T. pseudorhombi* Yamaguti, 1938
*T. madurensis* Nigrelli, 1940
*T. nanaimoensis* (McFarlane, 1936) Manter, 1947
*T. anguillae* Yamaguti, 1934 (Soganderes-Bernal, 1959)
*T. serrani* Nagaty, 1956 (Soganderes-Bernal, 1959)

| Hosts: | | | |
|---|---|---|---|
| | *Leptocottus armatus* | Ore. | McCauley, 1960 |
| | *Parophrys vetulus* | B.C. | McFarlane, 1936 |
| | *Scorpaenichthys marmoratus* | B.C. | McFarlane, 1936 |
| | *Psettichthys melanostictus* | Wash. | McCauley, 1960 |
| | *Psettichthys melanostictus* | Ore. | McCauley, 1960 |
| | *Oncorhynchus tshawytscha* | Ore. | McCauley, 1960 |
| | *Lepidopsetta bilineata* | Ore. | McCauley, 1960 |
| | *Platyichthys stellatus* | Ore. | McCauley, 1960 |
| | *Citharichthys sordidus* | Ore. | McCauley, 1960 |
| | *Citharichthys stigmaeus* | Ore. | McCauley, 1960 |
| | *Anoplarchus purpurescens* | Ore. | McCauley, 1960 |
| | *Enophrys bison* | Ore. | McCauley, 1960 |
| | *Ophiodon elongatus* | Ore. | McCauley, 1960 |
| | *Sebastodes caurinus* | Wash. | Ching, 1960b |
| | *Sebastodes melanops* | Wash. | Ching, 1960b |
| | *Sebastodes nigrocinctus* | Wash. | Ching, 1960b |
| | *Ophiodon elongatus* | Wash. | Ching, 1960b |
| | *Leptocottus armatus* | Wash. | Ching, 1960b |
| | *Hemilepidotus hemilepidotus* | Wash. | Ching, 1960b |
| | *Synchirus gilli* | Wash. | Ching, 1960b |
| | *Isopsetta isolepis* | Wash. | Ching, 1960b |
| | *Parophrys vetulus* | Wash. | Ching, 1960b |
| | *Theragra chalcogramma* | Wash. | Ching, 1960b |
| | *Oncorhynchus kisutch* | Wash. | Ching, 1960b |
| | *Gasterosteus aculeatus* | Wash. | Ching, 1960b |

Additional hosts have been reported from Siberia by Layman (1930); Japan by Yamaguti (1934, 1938, 1939, 1940, 1951); Madeira by Nigrelli (1940); and California by Park (1936).

Morphology: This worm was figured and described by each of the workers who described one of the synonyms and was redescribed by McCauley (1960). Nothing is known of the life history.

## Family HETEROPHYIDAE

### *Apophallus donicus* (Skrjabin and Lindtrop, 1919) Price 1931

Synonyms: *Rossicotrema donicum* Skrjabin & Lindtrop, 1919
*Rossicotrema simile* (Ransom, 1920) Ciurea, 1924
*Rossicotrema venustus* (Ransom, 1920) Morozov, 1952
*Cotylophallus similis* Ransom, 1920
*Cotylophallus venustus* Ransom, 1920

| Host: | Gull | Ore. | Shaw, 1947 |
|---|---|---|---|

Morphology: Described and figured by Morosov (1952) as *Rossicotrema donicum* which he considered to be the valid name.

### *Cryptocotyle lingua* (Creplin, 1825) Fischoeder, 1903

Synonyms: *Distoma lingua* Creplin, 1825
*Tocotrema lingua* of Looss, 1899
*Dermocystis ctenolabri* Stafford, 1905
*Hallum caninum* Wigdor, 1918

| Host: | *Larus glaucescens* | Wash. | Ching, 1960a |
|---|---|---|---|

Biology: Stunkard and Willey (1929) and Stunkard (1930) found that the pleurolophocercous cercaria develops in *Littorina littorea,* penetrates and encysts in the cunner, and excysts in the guts of birds and mammals.

### *Euryhelmis pacifica* Senger and Macy, 1952

| Hosts: | | | |
|---|---|---|---|
| | *Mustela vison* | Ore. | Senger & Macy, 1952 |
| | *Ondatra zibethica* | Ore. | Senger & Macy, 1952 |
| | *Sorex bendirii palmeri* (worms without eggs) | Ore. | Senger & Macy, 1952 |
| | *Peromyscus maniculatus* | Ore. | Senger & Macy, 1952 |
| | *Ondatra zibethica* | Ore. | Senger & Neiland, 1955 |
| | *Castor canadensis* | Ore. | Senger & Neiland, 1955 |
| | *Dicamptodon ensatus* (as metacercaria) | Ore. | Senger & Macy, 1952 |

### *Euryhelmis squamula* (Rudolphi, 1819) Poche, 1926

Synonyms: *Distoma squamula* Rudolphi, 1819
*Eurysoma squamula* (Rudolphi, 1819) Dujardin, 1845
*Monostomum squamula* Diesing, 1851

| Host: | *Mustela vison* | Ore. | Senger & Neiland, 1955 |
|---|---|---|---|

Morphology: Described and figured in Dawes (1946) and Morosov (1952). Morosov also included a long bibliography on this form.

Biology: Metacercariae encyst on the skin of frogs and are there eaten by the definitive host, according to Joyeaux, Baer, and Carrère (1934). In the Pacific Northwest metacercariae have been found on the surface of *Rana aurora* and *Rana aurora cascadae* (Senger and Macy, 1952).

***Galactosomum humbargari* Park, 1936**

| | | | |
|---|---|---|---|
| Hosts: | *Larus californicus* | Calif. | Park, 1936 |
| | *L. heermanni* | Wash. | Ching, 1960a |
| | *L. glaucescens* | Wash. | Ching, 1960a |
| | *L. philadelphia* | Wash. | Ching, 1960a |

***Metagonimoides oregonensis* Price, 1931**

| | | | |
|---|---|---|---|
| Hosts: | *Procyon lotor* | Ore. | Burns & Pratt, 1952; Shaw, 1947; Price, 1931 |
| | *Mustela vison* | Ore. | Senger & Neiland, 1955 |

Additional hosts from Georgia were given by Sawyer (1958).

Morphology: Redescribed by Morosov (1952).

Biology: Cercariae develop in *Oxytrema silicula* in Oregon and either leave the snail and encyst in a frog or develop into metacercariae within the redia. In either case the worm reaches the definitive host by this host eating the snail or frog. The metacercariae have been reported from *Rana aurora* (Burns and Pratt, 1952).

## Family LECITHODENDRIIDAE

***Acanthatrium oregonense* Macy, 1939**

Synonym: *Prosthodendrium* (*acanthatrium*) *oregonense* (Macy, 1939) Yamaguti, 1958

| | | | |
|---|---|---|---|
| Hosts: | *Myotis evotis* | Ore. | Macy, 1939b |
| | *M. californicus caurinus* | Ore. | Macy, 1939b |
| | *M. lucifugus* | Ore. | Knight & Pratt, 1955 |

Not known from other areas.

Taxonomy: Yamaguti (1958) stated that Skarbilovich (1948) placed this in the subgenus *Acanthatrium* of *Prosthodendrium*, but this is in error as Skarbilovich (1948) placed it in the subgenus *Acanthatrium* of the genus *Acanthatrium*. Cheng (1957a) gave a key to 14 species of the genus.

Biology: Virgulate xiphidiocercariae develop in *Oxytrema silicula* in Oregon, then enter caddis fly larvae where they move about unencysted. They apparently reach the chiropteran host after the metamorphosis of the insect (Knight and Pratt, 1955).

Morphology: See Macy (1939 )and Cheng (1959).

***Allassogonoporus marginalis*** **Oliver, 1938**

Synonyms: *A. vespertilionis* Macy, 1940 (Gilford, 1955)
*Myotitrema asymmetrica* Macy, 1939 (Gilford, 1955)

| Hosts: | | | |
|---|---|---|---|
| | *Myotis lucifugus* | Ore. | Knight & Pratt, 1955 |
| | *M. californicus caurinus* | Ore. | Macy, 1940a |
| | *Eptesicus fuscus* | Ore. | Knight & Pratt, 1955 |

Hosts from locations outside of the Pacific Northwest include the muskrat (Oliver, 1938) and an additional bat (Macy, 1939b).

Morphology: Additional description and figures contributed by Skarbilovich (1948).

Biology: Virgulate xiphidiocercariae develop in sporocysts in *Flumenicola virens* in Oregon, then encyst in the larvae of caddis flies as metacercariae (Knight and Pratt, 1955).

***Cephalophallus obscurus*** **Macy and Moore, 1954**

| Host: | | | |
|---|---|---|---|
| | *Mustela vison* (experimentally) | | Macy & Moore, 1954 |

Biology: Virgulate xiphidiocercariae develop in sporocysts in *Flumenicola virens* then encyst in crayfish (Macy and Moore, 1954). Not known outside of the Pacific Northwest.

***Cephalouterina dicamptodonti*** **Senger and Macy, 1953**

| Hosts: | | | |
|---|---|---|---|
| | *Dicamptodon ensatus* | Ore. | Senger & Macy, 1953 |
| | *Dicamptodon ensatus* | Ore. | Lehmann, 1954 |

Not known outside of the Pacific Northwest.

***Limatulum gastroides*** **Macy, 1935**

| Host: | | | |
|---|---|---|---|
| | *Myotis californicus caurinus* | Ore. | Macy, 1947 |

***Macyella postnoporus*** **Neiland, 1951**

| Host: | | | |
|---|---|---|---|
| | *Ixoreus naevis* | Wash. | Neiland, 1951 |

Not known outside of the Pacific Northwest.

## Family LEPOCREADIIDAE

***Opechona alaskensis*** **Ward and Fillingham, 1934**

| Host: | | | |
|---|---|---|---|
| | *Sebastodes ruberrimus* | Wash. | Ching, 1960b |

***Opechona occidentalis*** **Montgomery, 1957**

Synonym: *Pharyngora bacillaris* (Molin, 1859) of McFarlane, 1936

| Hosts: | | | |
|---|---|---|---|
| | *Sebastodes* sp. | B.C. | McFarlane, 1936 |
| | *Sebastodes maliger* | Wash. | Ching, 1960b |

Another report of this form was made by Montgomery (1957) from California. It was described by McFarlane but more completely described by Montgomery. The life cycle is unknown, but Lebour (1916) found late cercarial stages of what appeared to be *O. bacillaris* in a number of coelenterates.

***Opechona parvasoma* Ching, 1960**

Host: *Sebastodes melanops* Wash. Ching, 1960b

***Lepidapedon pugetensis* Acena, 1947**

Host: *Sebastodes nebulosus* Wash. Acena, 1947

Other records are unknown. Lebour (1908) found larval stages of *L. rachion* in *Cardium edule* but other knowledge of life histories in the genus is wanting. Hanson (1950) questioned the validity of the species. It was poorly described, and the types were not available.

***Lepidapedon calli* Acena, 1947**

Host: *Parophrys vetulus* Wash. Acena, 1947

Other records are unknown. Hanson (1950) stated that this cannot be a species of *Lepidapedon,* but she offered no suggestions as to the proper disposition of the species. See note on life history under *L. pugetensis.*

***Lepidapedon microcotyleum* (Odhner, mss.) Dollfus, 1953**

Host: *Theragra chalcogramma* Wash. Ching, 1960b

## Family LISSORCHIDAE

***Triganodistomum attenuatum* Mueller and Van Cleave, 1932**

Hosts: *Catostomus catostomus* B.C. Bangham & Adams, 1954
*Catostomus macrocheilus* B.C. Bangham & Adams, 1954

Additional record from New York (Mueller and Van Cleave, 1932). Wallace (1939, 1941) found *T. mutabile* to have tailless cercariae; it develops in species of *Helisoma* and encysts in *Chaetogaster* or *Planaria,* but nothing is known of the life history of *T. attenuatum.*

***Lissorchis* sp.**

Shaw (1947) reported *Lissorchis* from an unnamed host from Oregon.

## Family MICROPHALLIDAE

***Gymnophallus deliciosus* (Olsson, 1893) Odhner, 1900**

Synonym: *Distoma deliciosum* Olsson, 1893

Host: *Larus occidentalis* Ore. Reish, 1950

Hosts from Europe have been reported by Olsson (1893) and Timon-David (1955).

Taxonomy: The genus *Gymnophallus* was placed in Gymnophallidae by Morosov (1955) and in the Fellodistomatidae by Cable (1953). It probably does not belong in the Microphallidae, but its placement is still undecided.

Morphology: It is described and figured by both Dawes (1946) and Morosov (1955). The life history of this species has not been worked out, but other species of the genus are known. See Giard (1907), Jameson (1902), Hutton (1952), and Zelikman (1953). For additional bibliography see Yamaguti (1958).

***Gymnophallus obscurus* Ching, 1960**

| | | | |
|---|---|---|---|
| Host: | *Haematopus bachmani* | Wash. | Ching, 1960a |

***Levinseniella propinqua* Jagerskiold, 1907**

| | | | |
|---|---|---|---|
| Host: | *Haematopus bachmani* | Wash. | Ching, 1960a |

***Microphallus primas* (Jagerskiold, 1909) Stunkard, 1951**

Synonyms: *Spelophallus primas* Jagerskiold, 1909
*Microphallus primas* (Jagerskiold, 1909) Stunkard, 1951
*Spelotrema primas* (Jagerskiold, 1909) Belopol'skaya, 1952
*Microphallus primas* (Jagerskiold, 1909) Ching, 1960a

| | | | |
|---|---|---|---|
| Host: | *Haematopus bachmani* | Wash. | Ching, 1960a |

***Plenosoma minimum* Ching, 1960**

| | | | |
|---|---|---|---|
| Host: | *Haematopus bachmani* | Wash. | Ching, 1960a |

## Family MONORCHIDAE

***Telolecithus pugetensis* Lloyd and Guberlet, 1932**

| | | | |
|---|---|---|---|
| Hosts: | *Cymatogaster aggregata* | B.C. | McFarlane, 1936 |
| | *Cymatogaster aggregata* | Wash. | Lloyd & Guberlet, 1932 |
| | *Taeniotoca lateralis* | Ore. | *Lincoln Co. |

This trematode is unknown outside of the Pacific Northwest.

Biology: The life history is unknown. There is often great variation in the incidence of this parasite. In the summers of 1931 and 1932 Lloyd and Guberlet found nearly all the *Cymatogaster aggregata* examined to be infected with the parasite, but in the summer of 1934 several hundred fish failed to harbor a single worm (Lloyd, 1938).

## Family NANOPHYETIDAE

***Nanophyetus salmincola* (Chapin, 1926) Chapin, 1927**

Synonyms: *Nanophyes salmincola* Chapin, 1926
*Troglotrema salmincola* (Chapin, 1926) Witenberg, 1932
*Distomulum oregonensis* Ward & Mueller, 1926

| | | | |
|---|---|---|---|
| Hosts: | *Canis familiaris* | Ore. | Donham, 1925a, 1925b (Also in many veterinary reports and other papers from Oregon.) |
| | *Canis familiaris* | Wash. | Simms, Donham, & Shaw, 1931 |
| | *Canis familiaris* | Idaho | Philip, 1955 |
| | *Canis latrans lestis* | Wash. | Cram, 1926 |
| | *Canis latrans lestis* | Ore. | Donham & Simms, 1927 |

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

| | | |
|---|---|---|
| *Procyon lotor* | Wash. | Cram, 1926 |
| *Lynx rufus fasciatus* | Wash. | Cram, 1926 |
| *Mustela vison* | Ore. | Senger and Neiland, 1955 |
| *Canis vulpes* | Ore. | Donham, Simms, & Miller, 1926 |
| *Felis domesticus* | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| *Procyon lotor* | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| *Vulpa fulve* | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| *Vulpco fulva* | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| *Ursus americanus* | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| Guinea pigs | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| White rats | Experimentally | Simms, Donham, Shaw, & McCapes, 1931 |
| Hamster | Experimentally | Bennington & Pratt, 1960 |
| *Salmo clarkii* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Salmo gairdnerii* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Salvelinus fontinalis* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Oncorhynchus kisutch* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Oncorhynchus tshawytscha* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Oncorhynchus keta* | Ore. | Simms, Donham, Shaw, & McCapes, 1931 |
| *Oxytrema silicula* | Ore. | Sinitsin, 1930 |
| *Oxytrema silicula* | Wash. | *(This distribution has been implied in many papers but never so stated.) |

This parasite is limited to the area of Western Oregon, Southwestern Washington, and Northwestern California. Chapin (1926) reported rumors of this parasite from British Columbia, but they are doubtful.

Taxonomy: *Nanophyetus schikhobalowi* Skrjabin and Podiaposkaia, 1931, a parasite of man, was considered a synonym of *N. salmincola* by Witenberg (1932); however, Philip (1955) thought that since this form is not known from man in the Pacific Northwest, it must not be a synonym.

Morphology: The adult and the larval stages have been adequately described and figured by Bennington and Pratt (1960). Other figures can be found in Skrjabin (1958) for the adult and in Philip (1955) for the cercaria. The life stages were not figured by Sinitsin (1930) when he worked on the life cycle.

Biology: The worm is a parasite of various carnivores as listed above and produces a few eggs which hatch into miracidia in about 70 days. These develop rediae in *Oxytrema silicula* and form microcercous stylet cercariae. These cercariae find salmonid fish, encyst in the tissues of the fish, and are ultimately eaten by a carnivore where they develop into adults. The fluke is the vector of *Neorickettsia helminthoeca* Philip, Hadlow, and Hughes, 1953, and it is the causative agent for salmon poisoning of dogs. The work on this parasite and especially on the salmon poisoning aspects of it has been reviewed by Simms, Donham, and Shaw (1931), Simms, Donham, Shaw, and McCapes (1931), and more recently by Philip (1955). The reader is referred to the above-mentioned papers for references dealing with the salmon poisoning aspects of this parasite. Bennington and Pratt (1960) reworked the life history of the worm and figured many of the larval stages for the first time. Their references included most of the work pertaining to the biology of this worm.

***Xiphidiotrema lockeri* Senger, 1953**

| | | | |
|---|---|---|---|
| Hosts: | *Sorex bendirii palmeri* | Ore. | Senger, 1953 |
| | *Sorex palustris navigator* | Ore. | Senger, 1953 |

This parasite has not been reported elsewhere.

Taxonomy: Yamaguti (1958) placed this species in the subfamily Nephrotrematinae of the family Troglotrematidae, but Senger (1953) thought that it should be in the subfamily Nanophyetinae of the family Troglotrematidae. Skrjabin (1958) accepted Nanophyetidae Dollfus, 1939, as a family, but was apparently not aware of *Xiphidiotrema.* Yamuguti (1958) also accepted this family, but transferred *Xiphidiotrema* to Troglotrematidae without giving any reasons.

## Family NOTOCOTYLIDAE

***Notocotylus imbricatus* (Looss, 1893) U. Szidat, 1935**

Synonyms: *Cercaria imbricata* Looss, 1893
*Notocotylus gibbus* of Stunkard & Dunihue, 1931

| | | | |
|---|---|---|---|
| Host: | Domestic duck | Ore. | Dikmans, 1945 |

Additional hosts include several genera of waterfowl.

Taxonomy: Morgan and Hawkins (1949) considered *N. scineti* Fuhrmann, 1919, *N. urbanensis* Harrah, 1922, and *N. intestinalis* Tubangui, 1932, to be synonyms of *N. imbricatus.*

Morphology: This form was described and figured by Skrjabin (1953).

Biology: The life cycle has been worked out experimentally by U. Szidat (1933, 1935) and she showed that *Cercaria imbricata* encysts on vegetation, is eaten by ducks, and develops in them to the adult. In Oregon we found this cercaria developed in *Oxytrema silicula* and experimentally to maturity in the domestic duck.

### *Notocotylus urbanensis* (Cort, 1914) Harrah, 1922

Synonyms: *Cercaria urbanensis* Cort, 1914
*Monostomum* sp. Stiles & Hassell, 1894

| | | | |
|---|---|---|---|
| Hosts: | *Ondatra zibethica* | B.C. | Knight, 1951 |
| | *Ondatra zibethica* | Ore. | Rider & Macy, 1947 |

For additional hosts see Harrah (1922).

Morphology: This form has been redescribed by Skrjabin (1953).

Biology: Cercariae develop in various species of *Physa* and *Lymnaea,* emerge, encyst on vegetation, and develop in the definitive host—(Cort, 1914; Cort, McMullen, and Brackett, 1937; Cort, Oliver, and McMullen, 1941). Herber (1950, 1955) did a careful review of the life history work and showed certain discrepancies in the conclusions of the earlier workers.

### *Notocotylus* sp.

An unidentified species of *Notocotylus* has been reported from Oregon from *Ondatra zibethica* by Senger and Neiland (1955).

### *Ogmogaster plicatus* (Creplin, 1829) Jägerskiold, 1891

Synonyms: *Monostomum plicatum* Creplin, 1829
*Ogmogaster antarcticus* Johnston, 1931

| | | | |
|---|---|---|---|
| Hosts: | *Balaenoptera borealis* | B.C. | Margolis & Pike, 1955 |
| | *Balaenoptera physalis* | B.C. | Margolis & Pike, 1955 |

Additional hosts were reviewed by Margolis and Pike, 1955.

Taxonomy: Margolis and Pike (1955), Dawes (1946), and Price (1932a) agreed that *O. antarcticus* is a synonym of *O. plicatus* even though both Skrjabin (1953) and Yamaguti (1958) included *O. antarcticus* as a valid species.

Morphology. This form was figured and described by Skrjabin (1953). No life history is known for this genus.

### *Quinqueserialis quinqueserialis* (Barker and Laughlin, 1911) Harwood, 1939

Synonym: *Notocotylus quinqueserialis* Barker & Laughlin, 1911

| | | | |
|---|---|---|---|
| Hosts: | *Ondatra zibethica* | Wash. | Harrah, 1922 |
| | *Ondatra zibethica* | Ore. | Senger & Neiland, 1955 |
| | *Ondatra zibethica* | B.C. | Knight, 1951 |

Taxonomy: This form was confused with *Notocotylus urbanensis* by Harrah (1922) according to Herber (1955), and Yamaguti (1958). Synonymy was discussed by Smith (1954).

Morphology: Skrjabin (1953) described and figured the worm.

Biology: The cercariae of this form develop in *Gyraulus parvus* according to Herber (1939, 1942).

## Family OPECOELIDAE

### *Opecoelina radifistuli* (Acena, 1941) Manter, 1947

Synonym: *Didcutosaccus radifistuli* Acena, 1941

| Host: | *Sebastodes elongatus* | Wash. | Acena, 1941 |
|---|---|---|---|

Not known outside of the Pacific Northwest. Life histories in this genus are not known.

### *Opecoelina theragrae* Lloyd, 1938

| Hosts: | *Theragrae fuscnsis* | Wash. | Lloyd, 1938 |
|---|---|---|---|
| | *Sebastodes maliger* | Wash. | Ching, 1960b |

Not known outside of the Pacific Northwest. Life histories in this genus are not known.

### *Pseudopcoelus vulgaris* (Manter, 1934) Van Wicklen, 1946

Synonym: *Cymbephallus vulgaris* Manter, 1934

| Host: | *Lycodopsis pacifica* | Wash. | Lloyd, 1938 |
|---|---|---|---|

Additional hosts from Florida were reported by Manter (1934). No life history is known for this genus.

### *Plagioporous siliculus* Sinitsin, 1931

| Hosts: | *Salmo clarkii* | Ore. | Sinitsin, 1931a |
|---|---|---|---|
| | "Species of fresh water fishes" | Ore. | Sinitsin, 1931a |

Morphology: All life history stages have been outlined by Sinitsin (1931a). There are no other discussions of this worm.

Biology: Sinitsin (1931a) stated that sporocysts produce cotylomicrocercous cercariae in the digestive gland of *Oxytrema silicula* and that the cercariae actively penetrate crayfish where they encyst. The crayfish are eaten by the definitive host. Metacercariae often are so mature that eggs can be seen in them. Sinitsin stated that cercariae stand on their tails waving to and fro (a condition which we have frequently observed), and that when a crayfish passes near them, the cercariae bend toward the crayfish (a response which we have been unable to confirm). We have been unable to complete the life cycle as outlined by Sinitsin. Sinitsin did not prove the life cycle experimentally.

### *Plagioporus virens* Sinitsin, 1931

| Hosts: | *Cottus* sp. | Ore. | Sinitsin, 1931a |
|---|---|---|---|
| | "Fresh water fishes" | Ore. | Sinitsin, 1931a |

Morphology: Sinitsin described all the stages of the life cycle.

Biology: Sinitsin (1931a) stated that cotylomicrocercous cercariae develop in sporocysts in the liver of the stream snail *Flumenicola virens.* The cercariae behave similarly to those of *P. siliculus,* but they encyst in the snail *F. virens.* Each snail is usually infected with only a few metacercariae. Sinitsin did not prove this cycle experimentally.

***Podocotyle atomon*** (Rudolphi, 1802) Odhner, 1905

Synonyms: *Fasciola atomon* Rudolphi, 1802
*Distoma atomon* Rudolphi, 1809
*D. simplex* Rudolphi, 1809 of Olsson, 1868
*D. angulatum* Dujardin, 1845
*Allocreadium atomon* (Rudolphi) of Odhner, 1901
*Sinistropus simplex* Stafford, 1904, in part
*Psilostomum redactum* Nicoll, 1906
*Distomum vitellosum* Linton of Johnston, 1907
? *Fasciola aeglefini* Mueller, 1776, in part
*Podocotyle atomon* var. *dispar* Nicoll, 1909
The above synonymy is after Dawes (1946).

| Hosts: | | | |
|---|---|---|---|
| | *Leptocottus armatus* | B.C. | McFarlane, 1936 |
| | *Syngnathus grisco-lineatus* | B.C. | McFarlane, 1936 |
| | *Epigeichthys atropurpureus* | B.C. | McFarlane, 1936 |
| | *Hexagrammos stelleri* | B.C. | McFarlane, 1936 |

Additional hosts have been reported from Europe (Dawes, 1946, 1947; Palombi, 1934; Rees, 1945) and New England (Manter, 1926; Linton, 1940; Hunninen and Cable, 1943a).

Morphology: Dawes (1946, 1947) presented a short description of the species; Odhner (1901, 1905), Linton (1940), and Manter (1926) have described the species adequately; and Hunninen and Cable (1943) added a few notes to the description and figured it well.

Biology: Cotylomicrocercous cercariae are produced in sporocysts in *Littorina rudis* and penetrate and encyst in marine amphipods. Metacercariae are progenetic or may develop in the definitive host (Hunninen and Cable, 1943a). Shulman (1950) found a similar life history in the White Sea. Jones (1933) discussed fertilization and egg formation.

***Podocotyle abitionis*** McFarlane, 1936

| Hosts: | | | |
|---|---|---|---|
| | *Sebastodes* sp. | B.C. | McFarlane, 1936 |
| | *Sebastodes maliger* | Wash. | Ching, 1960b |

Not known outside of the Pacific Northwest. Life history of this species unknown. For life history of a related species see under *P. atomon* above.

***Podocotyle olssoni*** Odhner, 1905

Synonym: *Distoma simplex* Rudolphi, 1809 of Olsson, 1868

| Host: | | | |
|---|---|---|---|
| | *Leptocottus armatus* | Ore. | *Coos County |

Additional hosts have been reported from Sweden (Odhner, 1905), and New England (Manter, 1926; Linton, 1940).

Morphology: Described by Odhner (1905) and Manter (1926). Life history unknown. For life history of a related species see *P. atomon* above.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

***Podocotyle pacifica* Park, 1937**

| | | | |
|---|---|---|---|
| Host: | *Gasterosteus aculeatus* | Wash. | Ching, 1960b |

***Podocotyle pedunculata* Park, 1937**

| | | | |
|---|---|---|---|
| Host: | *Leptocottus armatus* | Wash. | Ching, 1960b |

***Podocotyle reflexa* (Creplin 1825) Odhner 1905**

Synonym: *Distomum reflexum* Creplin 1825

| | | | |
|---|---|---|---|
| Hosts: | *Sygnathus griseo-lineatus* | B.C. | McFarlane, 1936 |
| | *Leptocottus armatus* | B.C. | McFarlane, 1936 |
| | *Leptocottus armatus* | Ore. | *Coos County |

Additional hosts have been reported from Europe by Nicoll (1915), Odhner (1905), Baylis and Jones (1933), and Dawes (1946).

Morphology: This form is close to *P. atomon* and Dawes (1947) thought that it might be a synonym. It was briefly described by Odhner (1905) and by Dawes (1947). We know of no other description. The life history is unknown. For life history of a related form see *P. atomon* above.

***Podocotyle shawi* McIntosh, 1939**

Synonyms: *Allocreadium shawi* (McIntosh, 1939) Yamaguti, 1953
*Cainocreadium shawi* (McIntosh, 1939) Yamaguti, 1958

| | | | |
|---|---|---|---|
| Hosts: | *Oncorhynchus kisutch* | Ore. | McIntosh, 1939 |
| | *Salmo gairdnerii* | Ore. | McIntosh, 1939; Shaw, 1947 |
| | *Salmo clarkii* | Ore. | McIntosh, 1939; Shaw, 1947 |

Not known outside of the Pacific Northwest.

Taxonomy: The position of this species is uncertain. Manter (1947) doubted that it belonged to *Podocotyle* and suggested perhaps *Peracreadium* or *Cainocreadium*. Yamaguti (1953) accepted the former suggestion and placed it in the subgenus *Peracreadium* of *Allocreadium*. Later Yamaguti (1958) transferred the species to *Cainocreadium*. McIntosh (1939) stated that the cirrus was spiny, but did not show spines in his figure. We have examined many specimens and failed to observe spines. Manter (1947) cited the presence of spines as a reason for removing the species from *Podocotyle*. We will retain it in *Podocotyle* pending results of work in progress.

Morphology: The only adequate description is by McIntosh (1939). Nothing is known of the life history.

***Podocotyle sinusacca* Ching, 1960**

| | | | |
|---|---|---|---|
| Host: | *Leptocottus armatus* | Wash. | Ching, 1960b |

***Podocotyle* sp.**

Shaw (1947) reported *Podocotyle* sp. from *Salmo gairdnerii* and *Salmo clarkii* from Oregon.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

## Family ORCHIPEDIDAE

***Orchipedum tracheicola*** **Braun, 1901**

Host: *Olor buccinator* B.C. Cowan, 1946

For other hosts see Yamaguti (1958).

Morphology: Described and figured by both Dawes (1946) and Skrjabin (1947a). No life history is known for this genus or family.

## Family PARAMPHISTOMATIDAE

***Megalodiscus americanus*** **Chandler, 1923**

| Hosts: | *Taricha* sp. | Ore. | Lehmann, 1956 |
|---|---|---|---|
| | *Taricha granulosa* | Ore. | Lehmann, 1954 |
| | *Ambystoma gracile* | Ore. | Lehmann, 1956 |

Additional hosts from California (Lehmann, 1960) and Southeastern United States (Chandler, 1923).

Morphology: Described and figured by Skrjabin (1949). The life history is not known, but the history of the closely related *M. temperatus* is known and is discussed with that species below.

***Megalodiscus microphagus*** **Ingles, 1936**

Synonyms: *Diplodiscus microphagus* (Ingles, 1936) Walton, 1938
*Diplodiscus microphagus* (Ingles, 1936) Manter, 1938

Host: *Dicamptodon ensatus* Ore. McCauley & Pratt, 1959

Additional hosts from California (Ingles, 1936).

Morphology: Described and figured by Skrjabin (1949).

***Megalodiscus temperatus*** **(Stafford, 1905) Harwood, 1932**

Synonyms: *Diplodiscus temperatus* Stafford, 1905
*Megalodiscus ranophilus* Millzner, 1924
*Opisthodiscus americanus* Holl, 1928
*Cercaria inhabilis* Cort, 1941

Host: *Rana aurora* Ore. *Benton County

Additional hosts listed in Yamaguti (1958), Skrjabin (1949), and Lehmann (1960).

Morphology: Described and figured in Skrjabin (1949).

Biology: The life cycle as worked out by Krull and Price (1932) showed that frogs became infected from eating cysts when they devoured their own shed skin. The germ cell cycle was worked out by Van der Woude (1954). Polysaccharides in this worm were investigated by Singh (1958).

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

### *Ophioxenos dienteros* Sumwalt, 1926

| | | | |
|---|---|---|---|
| Hosts: | *Bufo boreas* | Wash. | Sumwalt, 1926 |
| | *Thamnophis sirtalis* | Wash. | Sumwalt, 1926 |
| | *Thamnophis ordinoides* | Wash. | Sumwalt, 1926 |
| | *Clemmys marmorata* | Ore. | Thatcher, 1954 |

This parasite has not been reported outside of the Pacific Northwest.

Morphology: Described and figured by Skrjabin (1949).

### *Paramphistomum cervi* (Schrank, 1790) Fischoeder, 1901

Synonyms: *Fasciola cervi* Schrank, 1790
*Festucaria cervi* Zeder, 1790
*Fasciola elaphi* Gmelin, 1791
*Monostoma conicum* Zeder, 1800
*Amphistoma conicum* Rudolphi, 1809
*Amphistoma cervi* Stiles and Hassell, 1900
*Cercaria pigmentata* Sonsino, 1892

Synonymy after Skrjabin (1949).

| | | | |
|---|---|---|---|
| Host: | Cattle | B.C. | Swales, 1933 |

Other North American hosts were recorded by Cram (1925), Krull (1933a), Price (1928), and Price and McIntosh (1944).

Taxonomy: Morgan and Hawkins (1949) thought that the taxonomy of this genus needed revision. Dawes (1946) included a great many more species as synonyms of *P. cervi.*

Morphology: This form was figured by Morgan and Hawkins (1949) and described and figured by Skrjabin (1949).

Biology: *Cercaria pigmentata* Sonsino, 1892, develops in various species of *Physa* and *Bullinus,* encysts readily, and is ultimately eaten by the definitive host. (Szidat, 1936; Looss, 1896; Takahashi, 1927; Brumpt, 1936; Balozet and Callot, 1938; and Dinnik, 1951.)

### *Paramphistomum* sp.

Several amphistomes have been reported from the Pacific Northwest which cannot be placed in a species with certainty. Bruce (1930) reported *Amphistomum conicum* from cattle of British Columbia, and one cannot be certain whether this was really *P. cervi* or *P. microbothrium* Fischoeder 1901, since *A. conicum* was not adequately defined. Dikmans (1945) reported *Paramphistomum* sp. from cattle from British Columbia and Oregon.

### *Stichorchis subtriquetrus* (Rudolphi, 1814) Lühe, 1909

Synonyms: *Amphistoma subtriquetrum* Rudolphi, 1814
*Distoma amphistomatoides* Bojanus, 1817
*Amphistomum subtriquetrus* Westrumb, 1823
*Cladorchis* (*Stichorchis*) *subtriquetrus* Fischoeder, 1901

Host: *Castor canadensis* Ore. Shaw, 1947; Senger & Neiland, 1955

Morphology: Described and figured by Skrjabin (1949).

Biology: Cercariae develop in *Fossaria parva* in Louisiana, encyst on lettuce, and develop experimentally in guinea pigs (Bennett and Humes, 1939).

### *Zygocotyle lunatum* (Diesing, 1836) Stunkard, 1916

Synonyms: *Amphistoma lunatum* Diesing, 1836
*Zygocotyle ceratosa* Stunkard, 1916
*Chiorchis lunatus* Travossos, 1921
*Cercaria poconensis* Willey, 1930

Hosts: *Olor buccinator* B.C. Cowan, 1946
*Anas platyrhynchus* Ore. *Exact location unknown

Additional hosts recorded in Yamaguti (1958).

Biology: Willey (1930, 1941) showed that *Cercaria poconensis* Willey, 1930, develops in species of *Helisoma* and develops to maturity in many ducks and some mammals. The lymph vessels are probably remnants of the cercarial excretory vesicle (Willey, 1954).

## Family PHILOPHTHALMIDAE

### *Echinostephilla haematopi*, Ching, 1960

Host: *Haematopus bachmani* Wash. Ching 1960a

Biology: Ching, 1960a, attempted the life history of this species.

### *Parorchis acanthus* (Nicoll, 1906) Nicoll, 1907

Synonyms: *Zeugorchis acanthus* Nicoll, 1906
*Parorchis avitus* Linton, 1914 (Cable & Martin, 1935)

Host: *Larus occidentalis* Ore. *Lincoln County

Hosts from the Atlantic have been listed by Nicoll (1906, 1907b) and Linton (1914).

Morphology: Described and figured by Dawes (1946) and Skrjabin (1947b). Rees (1939, 1940) elaborated on the morphology, embryology, etc., but Brien (1954) was not in complete agreement with her. Perez Vigueras (1956) redescribed and figured this form.

Biology: The life history has been worked out by Lebour (1914), Lebour and Elmhirst (1922), and Stunkard and Cable (1932). Oguri and Chu (1955) worked on the effect of diet on infections of *P. acanthus*.

* Asterisks denote new (previously unpublished) reports of the parasite in the area.

## Family PLAGIORCHIIDAE

### *Alloglossidium corti* (Lamont, 1921)

Synonyms: *Plagiorchis corti* Lamont, 1921
*Plagiorchis ameiurensis* McCoy, 1928
*Alloglossidium kenti* Simer, 1929

Synonymy after Van Cleave and Mueller, 1934.

| | | | |
|---|---|---|---|
| Hosts: | *Ictalurus nebulosus* | B.C. | Bangham & Adams, 1954 |
| | *Ictalurus nebulosus* | Idaho | Fritts, 1959 |

Additional hosts from other areas listed by Van Cleave and Mueller (1934) and Harmes (1959).

Morphology: The adult was figured and described by Van Cleave and Mueller (1934).

Biology: Xiphidiocercariae develop in species of *Helisoma* and encyst in mayfly and dragonfly larvae (McMullen, 1935; Crawford, 1937).

### *Haplometrana intestinalis* Lucker, 1931

Synonym: *Haplometrana utahensis* Olsen, 1937 (Waitz, 1959)

| | | | |
|---|---|---|---|
| Hosts: | *Rana pretiosa* | Wash. | Lucker, 1931 |
| | *Rana pretiosa* | Idaho | Waitz, 1959 |

Morphology: The reader is referred to the original description by Lucker (1931) and Olsen (1937) for morphological information.

Biology: Lophocercous xiphidiocercariae develop in *Physella utahensis;* frogs serve as both intermediate and definitive hosts (Olsen, 1937).

### *Lechriorchis plesientera* Sumwalt, 1926

| | | | |
|---|---|---|---|
| Hosts: | *Thamnophis sirtalis* | Wash. | Sumwalt, 1926 |
| | *Thamnophis ordinoides* | Wash. | Sumwalt, 1926 |

No other records of this parasite are known. The taxonomic position of this form is not completely clear. Skrjabin and Antipin (1957) placed this parasite in the family Ochetosomatidae. They also described and figured the form.

### *Neoglyphe locellus* (Kossack, 1910) Yamaguti, 1958

Synonyms: *Opisthioglyphe locellus* Kossack, 1910
*O.* (*Neoglyphe*) *locellus* (Kossack, 1910) Shaldybin, 1954

| | | | |
|---|---|---|---|
| Hosts: | *Lymnaea bulimoides* | Ore. | Macy &Moore, 1958 |
| | Hamster | Experimentally—Macy & Moore, 1958 | |

Also reported from Russia by Kossack (1910).

Taxonomy: *Neoglyphe* (Shaldybin, 1954) Yamaguti, 1958, was erected for those species of *Opisthioglyphe* found in mammals. Dollfus (1957) and Macy and Moore (1958) still retained *Opistohioglyphe* and the final decision on the proper designation must come later.

Morphology: Macy and Moore (1958) redescribed and figured the worm from material in Oregon.

Biology: Xiphidiocercariae develop in *Lymnaea bulminoides,* encyst in the sporocyst or in various species of insect, and develop to maturity in the hamster (experimentally) (Macy and Moore, 1958). Adults have been found in shrews in both Montana and Alaska, but apparently not in the area included in this checklist.

***Plagiorchis proximus*** **Barker, 1915**

Host: *Ondatra zibethica* B.C. Knight, 1951

Reported only from *Mustela vison* from other areas by Barker (1915).

***Plagiorchis vespertilionis parorchis*** **Macy, 1960**

Synonyms: *Fasciola vespertilionis* Müller, 1784
*Distoma vespertilionis* of Zeder, 1803
*D. lima* Rudolphi, 1809
*Lepoderma vespertilionis* of Looss, 1899
*Plagiorchis vespertilionis* (Müller, 1784) Braun, 1900

Hosts: *Myotis lucifugus alascensis* Wash. Macy, 1960
*Mus musculus* (experimental) Macy, 1956
*Lymnaea stagnalis* Wash. Macy, 1956
Ephemerid larvae (experimental)
Trichopterous larvae (experimental)
Dragon fly nymphs (experimental)
*Culex* mosquito larvae (experimental)

Biology: Xiphidiocercariae develop in *Lymnaea stagnalis,* encyst experimentally in four different sorts of immature insects, and develop experimentally in white mice. Macy (1960) decided that this form was a subspecies of the widely distributed *Plagiorchis vespertilionis* instead of a separate species as he had indicated in an abstract (Macy, 1956).

***Telorchis corti*** **Stunkard, 1915**

Synonyms: *Telorchis linstowi* Goldberger, 1911, *nec* Stossich, 1890
*Telorchis lobosus* Stunkard, 1915
*Telorchis insculpti* MacCallum, 1918
*Telorchis guttati* MacCallum, 1918
*Telorchis chelopi* MacCallum, 1918
*Telorchis pallidus* MacCallum, 1918
*Telorchis angustus* MacCalum, 1821, *nec* Stafford, 1900
*Cercorchis corti* (Stunkard, 1915) Perkins, 1928
*Telorchis stenoura* Ingles, 1930
*Cercorchis texanus* Harwood, 1932
*Cercorchis medius* McMullen, 1934, *nec* Stunkard, 1915

Above synonymy after Wharton, 1940.

Host: *Clemmys marmorata* Ore. Thatcher, 1954

Additional hosts are listed by Wharton (1940).

Morphology: See any of the authors of synonyms above for descriptions and figures.

Biology: Xiphidiocercariae develop in *Physella integra,* encyst in tadpoles, and develop to maturity in *Chrysemys picta.* They do not mature in *Thamnophis* sp., but do live for several weeks (McMullen, 1934).

### *Zeugorchis syntomentera* Sumwalt, 1926

Synonyms: *Pseudorenifer syntomentera* (Sumwalt, 1926) Allison & Holl, 1937
*Paralechriorchis syntomentera* (Sumwalt, 1926) Byrd and Denton, 1938

Hosts: *Thamnophis sirtalis* Wash. Sumwalt, 1926
*Thamnophis ordinoides* Wash. Sumwalt, 1926

No other hosts are known.

Taxonomy: This species was transferred to *Pseudorenifer* by Allison and Holl (1937) and then to *Paralechriorchis* by Byrd and Denton (1938). Yamaguti (1958) rejected both these proposals and retained *Zeugorchis.* Skrjabin and Antipin (1957) accepted the genus *Paralechriorchis.*

Morphology: Adult and larval stages were described and figured by Ingles (1933) and Skrjabin and Antipin (1957).

Biology: Xiphidiocercariae develop in *Physa gyrina,* enter tadpoles of *Rana aurora* or *Hyla regilla,* which are in turn eaten by snakes (Ingles, 1933).

## Family PSILOSTOMIDAE

### *Sphaeridiotrema globulus* (Rudolphi, 1819) Odhner, 1913

Synonym: *Distoma globulus* Rudolphi, 1819

Host: Birds Ore. Dikmans, 1945

Hosts from other areas in Yamaguti (1958).

Morphology: Described and figured by Skrjabin (1947c) and Dawes (1946).

Biology: Szidat (1937) showed that cercariae develop in *Bythinia tentaculata,* encyst on the inside of the shell of this snail, and develop to maturity in *Anas boschas.* Price (1934) showed that this parasite caused a fatal ulceration of the intestine in *Marila affinis.*

### *Pseudopsilostoma ondatrae* (Price, 1931) Yamaguti, 1958

Synonyms: *Psilostomum ondatrae* Price, 1931
*Ribeiroia ondatrae* (Price, 1931) Price, 1942

Host: *Larus californicus* Ore. Price, 1931c

This form has also been reported from the muskrat in other parts of North America by Price (1931c).

Taxonomy: Skrjabin (1947c) retained this form in the genus *Psilostomum,* but Yamaguti (1958) erected the new genus *Pseudopsilostoma* to include this form. *Psilostomum ondatrae* Price, 1931 of Beaver (1939) was considered to belong to *Ribeiroia* by Yamaguti (1958). If Yamaguti is correct, the life cycle as worked out by Beaver (1939) does not apply. The taxonomy of these forms needs clarification.

Biology: Kuntz (1951) discussed the embryology of the excretory system.

## Family SCHISTOSOMATIDAE

### *Trichobilharzia adamsi* Edwards and Jansch, 1955

| | | | |
|---|---|---|---|
| Host: | *Physa conformis* | B.C. | Edwards & Jansch, 1955 |

Only record. One immature female was recovered from a duckling. Edwards and Jansch (1955) described and figured all the known stages. This form can cause cercarial dermatitis in man.

### *Trichobilharzia elvae* (Miller, 1923)

Synonym: *Cercaria elvae* Miller, 1923

| | | | |
|---|---|---|---|
| Hosts: | *Lymnaea stagnalis* | Wash. | Macy & Moore, 1953 |
| | *L. stagnalis jugulus* | Wash. | Schell, 1959 |
| | *Lymnaea palustris nuttalliana* | Wash. | Hunter et al., 1949; Schell, 1959 |
| | *Lymnaea palustris nuttalliana* | Idaho | Schell, 1959 |
| | Ducklings | Experimentally | Macy, Moore, & Price, 1955 |

This form has also been reported from Michigan by Miller (1923).

Taxonomy: Macy and Moore (1953) believed this to be a valid species, but McMullen and Beaver (1945) believed it to be a synonym of the European species *T. ocellata.* The morphology was discussed by McMullen and Beaver (1945).

Biology: Furcocercous cercariae develop in the snail hosts and develop to maturity in birds. When the cercariae penetrate the skin of man they produce cercarial dermatitis (Macy, Moore, and Price, 1955).

### *Trichobilharzia oregonensis* (MacFarlane and Macy, 1946) Macy and Moore, 1953

Synonym: *Cercaria oregonensis* McFarlane & Macy, 1946

| | | | |
|---|---|---|---|
| Hosts: | *Physa ampullacea* | Ore. | McFarlane & Macy, 1946 |
| | Ducks | Experimentally | Macy, Moore, & Price, 1955 |
| | Geese | Experimentally | Macy, Moore, & Price, 1955 |

This form is known only in the Pacific Northwest.

Morphology: Well described and figured by Macy, Moore, and Price (1955).

Biology: Furcocercous cercariae develop in *Physa ampullacea* and penetrate the definitive host. The cercariae produce cercarial dermatitis in man (Macy, Moore, and Price, 1955).

### *Trichobilharzia physellae* (Talbot, 1936) McMullen and Beaver, 1945

Synonyms: *Cercaria physellae* Talbot, 1936
*Pseudobilharzia quequeduale* McLeod, 1937

| | | | |
|---|---|---|---|
| Hosts: | *Physa ampullacea* | Ore. | Macy & Moore, 1953 |
| | *Physa gyrina* | Idaho | Schell, 1959 |

Additional hosts have been reported from Manitoba (McLeod, 1937; McLeod and Little, 1942) and Michigan (McMullen and Beaver, 1945).

Biology: The life history has been experimentally worked out by McLeod and Little (1942) and McMullen and Beaver (1945). Furcocercous cercariae develop in species of *Physa* and mature in various birds. When the cercariae penetrate man they cause cercarial dermatitis.

### *Gigantobilharzia huronsis* Najim, 1950

| | | | |
|---|---|---|---|
| Host: | *Physa gyrina* | Idaho | Schell, 1959 |

Additional hosts were reported by Najim (1950). Woodhead (1955) described the miracidium.

Biology: Najim (1950) reported that the cercariae from snails produced adults in chicks and canaries. His description was in abstract only.

### *Schistosomatium douthitti* (Cort, 1915) Price, 1931

Synonym: *Cercaria douthitti* Cort, 1915

| | | | |
|---|---|---|---|
| Host: | *Lymnaea palustris nuttalliana* | Idaho | Schell, 1959 |

Additional hosts have been reported from Illinois (Cort, 1914, 1915b), Michigan (Cort, 1918, 1936; Price, 1931a), Wisconsin (Brackett, 1940), Minnesota (Penner, 1938).

Biology: The life history was worked out by Price (1931a) and involved furcocercous cercariae developing in the snail hosts and becoming adults in several mammals. Kagan, Short, and Nez (1954) discussed the laboratory propagation of the trematode and had an extensive bibliography. The cercariae cause dermatitis in man.

### *Cercaria columbiensis* Edwards and Jansch, 1955

| | | | |
|---|---|---|---|
| Host: | *Physa conformis* | B.C. | Edwards & Jansch, 1955 |

This form has not been found since and nothing is known of the biology, except that it causes dermatitis.

### *Cercaria tuckerensis* Miller, 1927

| | | | |
|---|---|---|---|
| Host: | *Planorbis* sp. | Wash. | H. M. Miller, 1927 |

This dermatitis-producing cercaria has not been reported since.

***Cercaria robinsonensis*** **Schell, 1959**

Host: *Physa gyrina* Idaho Schell, 1959

This cercaria has not been reported elsewhere. It causes cercarial dermatitis (Schell, 1959).

***Schistosoma haematobium*** **(Bilharz, 1852) Weinland, 1858**

Lloyd (1913) reported a case of *Bilharzia haematobia* in Seattle, Washington, from a man who had come from Africa. This trematode cannot be considered a part of the natural trematode fauna of the Pacific Northwest.

## Family SPIRORCHIDAE

***Spirorchis artericola*** **(Ward, 1921) Stunkard, 1925**

Host: *Clemmys marmorata* Ore. Thatcher, 1954

Morphology: Skrjabin (1951) described and figured the worm. The germ cell cycle was worked out by Cort, Ameel, and Van Der Woude (1954).

Biology: Cercariae develop in sporocysts in *Helisoma trivolvis* then penetrate the turtle (Pieper, 1953). Other life history studies have been made by Ward (1921) and Stunkard (1923).

## Family STEGODERMATIDAE

***Deretrema cholaeum*** **McFarlane, 1936**

Host: *Sebastodes* sp. B.C. McFarlane, 1936

Unknown outside of the Pacific Northwest.

Morphology: Also figured and described by Skrjabin (1957).

## Family SYNCOELIIDAE

***Syncoelium katuwo*** **Yamaguti, 1938**

Synonym: *Syncoelium filiferum* (Sars) of Lloyd & Guberlet, 1936 (Manter 1954)

Hosts: *Oncorhynchus nerka* Wash. Lloyd & Guberlet, 1936
*O. gorbuscha* Wash. Lloyd & Guberlet, 1936

Additional host reported from Japan by Yamaguti (1938).

Morphology: Adequate descriptions are available (Yamaguti, 1938; Lloyd and Guberlet, 1936).

Biology: The life cycle is unknown. Sars (1885) described *S. filiferum* from euphausids, and these are possible intermediate hosts.

## Family ZOOGONIDAE

***Zoogonoides viviparus*** **(Olsson, 1868) Odhner, 1902**

Synonyms: *Distoma viviparum* Olsson, 1868
*Zoogonus viviparus* (Olsson) of Looss, 1901
*Zoogonoides subaequiporus* Odhner, 1911

Host: *Microstomus pacificus* Wash. Ching, 1960b

Biology: The morphology and life cycle of *Z. laevis* was described by Stunkard (1943). Dawes (1946) thought that *Z. laevis* might be a synonym of *Z. viviparus*.

***Steganoderma formosum*** **Stafford, 1904**

Host: *Parophrys vetulus* Wash. Ching, 1960b

## Digenetic trematodes of uncertain status

**Monostone cercariae**

Lehmann (1956) reported monostone cercariae encysted upon the rectal mesentery of a single *Ambystoma gracile* from Oregon.

***Cercaria burti*** **Miller, 1923**

H. M. Miller (1925b, 1927) reported this form from *Lymnaea stagnalis* from Washington. He also reported it from Michigan (1923, 1926). It is a furcocercous form.

***Cercaria sanjuanensis*** **Miller, 1927**

H. M. Miller (1927) described *Cercaria sanjuanensis* from *Lymnaea stagnalis* from Washington. It is a pharyngeal longifurcate form.

***Cercaria hirsuta*** **Miller, 1927**

H. M. Miller (1927) described *Cercaria hirsuta,* a furcocercous form, from *Planorbis* sp. from Washington.

***Cercaria granula*** **Miller, 1927**

H. M. Miller (1927) described *Cercaria granula,* a furcocercous form, from *Planorbis* sp. from Washington.

***Cercaria absurda*** **Miller, 1927**

H. M. Miller (1927) described *Cercaria absurda,* a furcocercous cercaria, from *Planorbis* sp. from Washington.

***Cercaria bulbocauda*** **Miller, 1927**

This furcocercous cercaria was described from *Planorbis* sp. from Washington by H. M. Miller (1927).

***Cercaria searlesiae*** **Miller, 1925**

This cotylocercous cercaria was described from *Searlesia dira* from Washington by Miller (1925a).

***Cercaria foliata*** **Miller, 1925**

An opthalmocercaria described by Miller (1925a) from *Pterorytis* (=*Purpura*) *foliata* from Washington.

***Cercaria purpuracaudata* Miller, 1925**

A binoculate magnacercous monostome was described by Miller (1925a) from *Bittium eshrichti* from Washington.

**Cystophorous cercaria "A" of Miller, 1925**

This cystophorous cercaria was described by Miller (1925a) from *Thais emarginata* from Washington.

**Cystophorous cercaria "B" of Miller, 1925**

This cystophorous cercaria was described by Miller (1925a) from *Thais lamellosa* from Washington.

**Flukes**

Shaw, Simms, and Muth (1934) reported "two kinds of flukes" from the Klamath Lake Sucker (*Deltistes* sp. or *Chasmistes* sp.) from Oregon.

# Host List

## INVERTEBRATE HOSTS

Phylum CTENOPHORA

Family BOLINOPSIDAE

*Bolinopsis microptera* (Agazziz)

*Lecithochirium* sp.

Phylum ARTHROPODA

Class CRUSTACEA

Subclass OSTRACODA

Family CYPRIDAE

*Cypridopsis vidua* (Müller)

*Halipegus occidualis*

Subclass COPEPODA

Family CALIGIDAE

*Caligus* sp. (on *Raja binoculata*)

*Udonella caligorum*

*Lepeophtheirus* sp. (on *Ophiodon elongatus*)

*Udonella opiodontis*

Subclass MALACOSTRACA

*Pacifastacus* sp. Crayfish

*Crepidostomum cooperi*
*Cephalophallus obscurus*
*Plagioporus siliculus*

Class INSECTA

Order DIPTERA

Mosquito larvae

*Plagiorchis parorchis*

Order EPHEMERIDA

Mayflies

*Crepidostomum cooperi*

Order TRICHOPTERA

Caddis flies

*Acanthatrium oregonense*
*Allassogonoporus marginalis*
*Parorchis acanthus*

Phylum MOLLUSCA

Class GASTROPODA

Order PULMONATA

Family LYMNAEIDAE

*Galba bulminoides*—synonym of *Lymnaea bulminoides bulminoides*

*Galba ferruginea*—synonym of *Lymnaea ferruginea*

*Lymnaea bulminoides bulminoides* Lea

Synonym: *Galba buliminoides*
*Fasciola hepatica*
*Neoglyphe locellus*

*Lymnaea ferruginea* Haldeman

Synonym: *Galba ferruginea*
*Fasciola hepatica*

*Lymnaea palustris nuttalliana* Lea

Synonym: *Stagnicola palustris nuttalliana*
*Trichobilharzia elvae*
*Schistosomatium douthitti*

*Lymnaea stagnalis* (Linnaeus)
*Plagiorchis parorchis*
*Trichobilharzia elvae*
*Cercaria burti*
*Cercaria sanjuanensis*

*Lymnaea stagnalis jugulus* Say
*Trichabilharzia elvae*

*Lymnaea trunculata* (?)
*Fasciola hepatica*

*Stagnicola palustris nuttalliana*—synonym of *Lymnaea palustris nuttalliana*

Family PHYSIDAE

*Physa ampullacea* Gould
*Trichobilharzia physellae*
*Trichobilharzia oregonensis*

*Physa conformis* Tryon
*Trichobilharzia adamsi*
*Cercaria columbiensis*

*Physa gyrina* Say
*Trichobilharzia physellae*
*Cercaria robinsonensis*
*Gigantobilharzia huronensis*

Family PLANORBIDAE

*Helisoma subcreatum* (?) (error of *H. subcrenatus* ?)

Synonym of *Planorbis trivolvis subcrenatus*

*Planorbis* sp.

*Cercaria hirsuta*
*Cercaria granula*
*Cercaria absurda*
*Cercaria bulbocaudata*
*Cercaria cita*
*Cercaria tuckerensis*

*Planorbis trivolvis subcrenatus* Carpenter

*Halipegus occidualis*

Order PROSOBRANCHIATA

Family BULIMIDAE

*Flumenicola virens* (Lea)

*Allassogonoporus marginalis*
*Cephalophallus obscurus*
*Plagioporus virens*
*Sanguinicola klamathensis*

Family CERITHIIDAE

*Bittium eschrichti* Middendorf

*Cercaria purpuracaudata*

Family MURICIDAE

*Pterorytis foliata* Gmelin

Synonym: *Purpura foliata*

*Cercaria foliata*

*Purpura foliata*—synonym of *Pterorytis foliata*

*Thais emarginata* (Deshayes)

Cystophorous cercaria A

*Thais lamellosa* (Gmelin)

Cystophorous cercaria B

Family NEPTUNEIDAE

*Searlesia dira* (Reeve)

*Cercaria searlesiae*

Family PLEUROCERIDAE

*Goniobasis plicifera silicula*—synonym of *Oxytrema silicula*

*Goniobasis silicula*—synonym of *Oxytrema silicula*

*Oxytrema silicula* (Gould)

Synonyms: *Goniobasis plicifera silicula*
*Goniobasis silicula*
*Acanthatrium oregonense*
*Nanophyetus salmincola*
*Notocotylus imbricatus*
*Plagioporus siliculus*

## FISH HOSTS

Phylum CHORDATA

Class PISCES

Family BATRACHOIDIDAE

*Porichthys notatus* (Girard) Midshipman
*Lecithaster salmonis*
*Derogenes varicus*

Family BOTHIDAE

*Citharichthys sordidus* (Girard) Mottled Sand-dab
*Tubulovesicula lindbergi*

*Citharichthys stigmaeus* Jordan and Gilbert Speckled Sand-dab
*Tubulovesicula lindbergi*

Family CATOSTOMATIDAE

*Catostomus catostomus* (Forster) Fine-scaled Sucker
*Allocreadium lobatum*
*Diplostomulum* sp.
*Neascus* sp.
*Octomacrum lanceatum*
*Plagiocirrus* sp.
*Postodiplostomum minimum*
*Tetracotyle* sp.
*Triganodistomum attenuatum*

*Catostomus columbianus palouseanus* (Schultz and Thompson)
Palouse Fine-scaled Sucker
*Gyrodactylus* sp.
*Postodiplostomum minimum*

*Catostomus commersonii* (Lacepede) White Sucker
*Diplostomulum* sp.

*Catostomus macrocheilus* Girard Coarse-scaled Sucker
*Allocreadiidae*
*Diplostomulum* sp.
*Neascus* sp.
*Octomacrum lanceatum*

*Plagiocirrus primus*
*Plagiocirrus testeus*
*Postodiplostomum minimum*
*Tetracotyle* sp.
*Triganodistomum attenuatum*

"Klamath Lake Suckers" (probably *Deltistes* sp. or *Chasmistes* sp.) "Flukes"

Family CENTRARCHIDAE

*Lepomis gibbosus* (Linnaeus) Pumpkin-seed
*Postodiplostomum minimum*
*Neascus* sp.

*Lepomis macrochirus* Rafinesque Bluegill
*Postodiplostomum minimum*

*Micropterus salmonides* (Lacepede) Large-mouth Black-bass
*Diplostomulum* sp.
*Neascus* sp.

Family CHIMAERIDAE

*Hydrolagus colliei* (Lay and Bennett) Ratfish
*Chimaericola leptogaster*

Family COREGONIDAE

*Prosopium cylindraceum* (Pallas) Round Whitefish
*Diplostomulum* sp.

*Prosopium williamsoni* (Girard) Rocky Mountain Whitefish
*Allocreadium lobatum*
*Crepidostomum farionis*
*Discocotyle salmonis*
*Diplostomulum* sp.
*Podocotyle shawi*
*Tetracotyle* sp.

Family COTTIDAE

*Aspicottus bison*—synonym of *Enophrys bison*

*Blepsias cirrhosis* (Pallas) Silver Spot
*Genolinea laticauda*

*Clinocottus embryum* (Jordan and Starks) Mossy Sculpin
*Lecithaster salmonis*
*Derogenes varicus*

*Cottus asper* Richardson Prickly Bullhead
*Crepidostomum isotomum*
*Diplostomulum* sp.
*Tetracotyle* sp.

*Cottus rhotheus* (Rosa Smith) Torrent Sculpin
*Diplostomulum* sp.
*Tetracotyle* sp.

*Cottus* sp.
*Plagioporus virens*

*Dasycottus setiger* Bean Spiny-headed Sculpin
*Genolinea manteri*

*Enophrys bison* (Girard) Buffalo Sculpin

Synonym: *Aspicottus bison*
*Genolinea laticauda*
*Genolinea manteri*
*Intuscirrus aspicotti*
*Prosorhynchus squamatus*
*Tubulovesicula lindbergi*

*Hemilepidotus hemilepidotus* (Tiselius) Red Irish Lord
*Tubulovesicula lindbergi*

*Leptocottus armatus* Girard Common Sculpin
*Bucephalopsis ozakii*
*Derogenes varicus*
*Genolinea laticauda*
*Genolinea manteri*
*Genolinea montereyensis*
*Lecithaster salmonis*
*Podocotyle atomon*
*Podocotyle olssoni*
*Podocotyle pedunculata*
*Podocotyle reflexa*
*Podocotyle sinusacca*
*Tubulovesicula lindbergi*

*Radulinus asprellus* Gilbert Darter Sculpin
*Microcotyle* sp.

*Scorpaenichthys marmoratus* (Ayres) Giant Marbled Sculpin
*Genolinea laticauda*
*Prosorhynchus crucibulus*
*Tubulovesicula lindbergi*

*Synchirus gilli* Bean Manacled Sculpin
*Tubulovesicula lindbergi*

Family CYPRINIDAE

*Acrocheilus alutaceum* Agassiz and Pickering Chisel-mouth
*Postodiplostomum minimum*
*Dactylogyrus vancleavei*
*Neascus* sp.

*Coucsius plumbeus* (Agassiz) Lake Chub
*Allocreadium lobatum*
*Dactylogyrus banghami*
*Dactylogyrus mylocheilus*
*Diplostomulum* sp.
*Gyrodactylus coucsius*
*Neascus* sp.
*Postodiplostomum minimum*
*Octomacrum* sp.
*Tetracotyle* sp.

*Cyprinus carpio* Linnaeus Carp
*Dactylogyrus anchoratus*
*Dactylogyrus extensus*

*Mylocheilus caurinum* (Richardson) Chub
*Allocreadium lobatum*
*Diplostomulum* sp.
*Clinostomum marginatum*
*Dactylogyrus mylocheilus*
*Postodiplostomum minimum*
*Neascus* sp.
*Tetracotyle* sp.

*Ptychocheilus oregonensis* (Richardson) Squaw-fish
*Allocreadium lobatum*
*Dactylogyrus columbiensis*
*Dactylogyrus ptychocheilus*
*Dactylogyrus tridactylus*
*Dactylogyrus vancleavei*
*Diplostomulum* sp.
*Neascus* sp.
*Postodiplostomum minimum*
*Tetracotyle* sp.

*Rhinichthys cataractae* (Cuvier and Valenciennes) Long-nosed Dace
*Dactylogyrus banghami*
*Neascus* sp.
*Postodiplostomum minimum*

*Richardsonius balteatus* (Richardson) Red-sided Shiner
*Clinostomum marginatum*
*Dactylogyrus banghami*
*Dactylogyrus richardsonius*
*Diplostomulum* sp.
*Neascus* sp.
*Postodiplostomum minimum*
*Octomacrum* sp.
*Tetracotyle* sp.

Family EMBIOTOCIDAE

*Cymatogaster aggregata* Gibbons Yellow Shiner
*Lecithaster salmonis*
*Telolecithus pugetensis*

*Embiotoca lateralis*—synonym of *Taeniotoca lateralis*

*Taeniotoca lateralis* (Agassiz) Blue Sea Perch

Synonym: *Embiotoca lateralis*
*Telolecithus pugetensis*

Family GADIDAE

*Lota lota* (Linnaeus) Ling
*Crepidostomum farionis*
*Crepidostomum* sp.
*Diplostomulum* sp.
*Postodiplostomum minimum*

*Microgadus proximus* (Girard) Tomcod
*Derogenes varicus*
*Hemiurus levinseni*

*Theregra fuccnsis* (Pallas) Whiting
*Opecoelina theregrae*

*Theregra chalcogamma* (Pallas) Whiting
*Hemiurus levinseni*
*Lepidapedon microcotyleum*
*Tubulovesicula lindbergi*

Family GASTEROSTEIDAE

*Gasterosteus cataphractus*—This host reported from B.C. by Guberlet (1937) has never been reported from the Northwest and probably should be considered *G. aculeatus*.

*Gasterosteus aculeatus* Linnaeus Three-spined Stickleback
*Bunodera cucaliae*
*Crepidostomum cornutum*
*Derogenes varicus*
*Diplostomulum* sp.
*Gyrodactylus elegans*
*Lecithaster salmonis*
*Podocotyle pacifica*
*Postodiplostomum minimum*
*Parahemiurus merus*
*Tetracotyle* sp.
*Tubulovesicula lindbergi*

*Eucalia inconstans* (Kirtland) Brook Stickleback
*Bunodera eucaliae*
*Tetracotyle* sp.

Family HEXAGRAMMIDAE

*Chiropsis decagrammos*—synonym of *Hexagrammos decagrammos*

*Hexagrammos decagrammos* (Pallas) Kelp Greenling

Synonym: *Chiropsis decagrammos*
*Microcotyle chiri*

*Hexagrammos stelleri* Tiselius White-spotted Greenling
*Podocotyle atomon*

*Ophiodon elongatus* Girard Lingcod
*Derogenes crassus*
*Derogenes varicus*
*Genolinea laticauda*
*Gyrodactylus elegans*
*Hemiurus levinseni*
*Lecithochirium exodicum*
*Microcotyle sebastis*
*Prosorhynchus facilis*
*Rhipidocotyle elongatum*
*Stephanostomum casum*
*Stephanostomum tristephanum*
*Tubulovesicula lindbergi*
*Udonella ophiodontis* on *Lepeophtheirus* sp.

Family HEXANCHIDAE

*Hexanthus griseus* (Bonnaterre) Shovelnose Shark
*Otodistomum plicatum*
*Otodistomum veliporum*
*Squalonchocotyle grisea*

Family ICTALURIDAE

*Ameiurus melas*—synonym of *Ictalurus melas*

*Ameiurus natalis*—synonym of *Ictalurus natalis*

*Ameiurus nebulosus*—synonym of *Ictalurus nebulosus*

*Ictalurus melas* (Rafinesque) Black Catfish

Synonym: *Ameiurus melas*
*Phyllodistomum staffordi*

*Ictalurus natalis* (LeSueur)

Synonym: *Ameiurus natalis*
*Phyllodistomum staffordi*

*Ictalurus nebulosus* (LeSueur) Brown Catfish

Synonym: *Ameiurus nebulosus*
*Alloglossidium corti*
*Phyllodistomum staffordi*

Family MERLUCCIIDAE

*Merluccius productus* (Ayres) Hake
*Lecithophyllum anteroporum*

Family MOLIDAE

*Mola mola* (Linnaeus) Ocean Sunfish
*Accocladocoelium macrocotyle*
*Odhnerium calyptrocotyle*

Family PLEURONECTIDAE

*Eopsetta jordani* (Lockington) Petrale Sole
*Lecithchirium exodicum*

*Hippoglossus stenolepis* Schmidt Halibut
*Entobdella squamula*

*Isopsetta isolepis* (Lockington) Butter Sole
*Derogenes varicus*
*Tubulovesicula lindbergi*

*Lepidopsetta bilineata* (Ayres) Rock Sole
*Tubulovesicula lindbergi*

*Microstomus pacificus* (Lockington) Dover Sole
*Stephanostomum tristephanum*
*Fellodistomum brevum*

*Paralichthys californicus* (Ayres) (Probably a California record)
*Entobdella squamula*

*Parophrys vetulus* Girard Lemon Sole
*Tubulovesicula lindbergi*
*Lepidapedon calli*
*Steganoderma formosum*

*Platyichthys stellatus* (Pallas) Starry Flounder
*Bucephalopsis ozakii*
*Derogenes varicus*
*Lecithochirium exodicum*
*Parahemiurus merus*
*Tubulovesicula lindbergi*

*Pleuronichthys decurrens* (Jordan and Gilbert) Curl-fin Sole
*Fellodistomum furcigerum*

*Psettichthys melanostictus* Girard Sand Sole
*Tubulovesicula lindbergi*

Family RAJIDAE

*Raja binoculata* Girard — Big Skate
- *Acanthocotyle pacifica*
- *Acanthocotyle pugetensis*
- *Merizocotyle pugetensis*
- *Otodistomum veliporum*
- *Rajonchocotyle batis*
- *Udonella caligorum* on *Caligus* sp.

*Raja rhina* Jordan and Gilbert — Long-nosed Skate
- *Acanthocotyle pacifica*

*Raja stellulata* Jordan and Gilbert — Prickly Skate
- *Acanthocotyle pacifica*
- *Rajonchocotyle batis*

Family SALMONIDAE

*Oncorhynchus gorbuscha* (Walbaum) — Humpback Salmon
- *Genolinea oncorhynchi*
- *Hemiurus levinseni*
- *Lecithophyllum anteroporum*
- *Syncoelium katuwo*

*Oncorhynchus keta* (Walbaum) — Chum Salmon
- *Nanophyetus salmincola*

*Oncorhynchus kisutch* (Walbaum) — Silver Salmon
- *Crepidostomum farionis*
- *Diplostomulum* sp.
- *Derogenes* sp.
- *Lecithaster salmonis*
- *Nanophyetus salmincola*
- *Podocotyle shawi*
- *Tubulovesicula lindbergi*

*Oncorhynchus nerka* (Walbaum) — Sockeye Salmon
- *Crepidostomum farionis*
- *Lecithaster salmonis*
- *Lecithophyllum anteroporum*
- *Podocotyle shawi*
- *Syncoelium katuwo*
- *Tetracotyle* sp.

*Oncorhynchus nerka kennerlyi* (Suckley) — Kokanee Red Salmon
- *Crepidostomum farionis*
- *Crepidostomum* sp.
- *Podocotyle shawi*

*Oncorhynchus tshawytscha* (Walbaum) Chinook Salmon
*Brachyphallus crenatus*
*Derogenes* sp.
*Hemiurus levinseni*
*Lecithaster salmonis*
*Lecithaster* sp.
*Nanophyetus salmincola*
*Tubulovesicula lindbergi*

*Salmo gairdnerii* Richardson Rainbow Trout; Steelhead
*Aponurus* sp.
*Crepidostomum cooperi*
*Crepidostomum farionis*
*Derogenes* sp.
*Diplostomulum* sp.
*Gyrodactylus elegans*
*Gyrodactylus* spp.
*Nanophyetus salmincola*
*Podocotyle shawi*
*Podocotyle* sp.

*Salmo gairdnerii kamloops* (Jordan) Kamloops Trout
*Allocreadium lobatum*
*Crepidostomum farionis*

*Salmo clarkii* Richardson Cutthroat Trout
*Crepidostomum farionis*
*Crepidostomum* sp.
*Derogenes* sp.
*Diplostomulum* sp.
*Nanophyetus salmincola*
*Neascus* sp.
*Plagioporus siliculus*
*Podocotyle shawi*
*Podocotyle* sp.

*Salmo clarkii henshawi* (Gill and Jordan) Lahontan Cutthroat
*Sanguinicola klamathensis*

*Salmo trutta* Linnaeus Brown Trout
*Gyrodactylus elegans*

*Salvelinus fontinalis* (Mitchell) Eastern Brook Trout
*Alaria* sp.
*Crepidostomum cooperi*
*Crepidostomum farionis*
*Crepidostomum* sp.
*Diplostomulum* sp.
*Nanophyetus salmincola*
*Neascus* sp.

*Salvelinus alpinus malma*—synonym of *Salvelinus malma*

*Salvelinus malma* (Walbaum) Dolly Varden Trout

Synonym: *Salvelinus alpinus malma*
*Aponurus* sp.
*Brachyphallus crenatus*
*Bucephalopsis ozakii*
*Crepidostomum cooperi*
*Crepidostomum* sp.
*Diplostomulum* sp.
*Discocotyle salmonis*
*Lecithaster salmonis*
*Neascus* sp.
*Tetracotyle* sp.

Family SCORPAENIDAE

*Sebastodes alutus* (Gilbert) Long-jawed Rock-fish
*Megalocotyle trituba*

*Sebastodes caurinus* (Richardson) Copper Rock-fish
*Derogenes varicus*
*Hemiurus levinseni*
*Megalocotyle marginata*
*Microcotyle sebastis*
*Tubulovesicula lindbergi*

*Sebastodes diploproa* (Gilbert) Lobe-jawed Rock-fish
*Megalocotyle trituba*

*Sebastodes elongatus* (Ayres) Green-striped Rock-fish
*Opecoelina radifistula*

*Sebastodes maliger* (Jordan and Gilbert) Orange-spotted Rock-fish
*Aporocotyle simplex*
*Derogenes varicus*
*Lecithochirium exodicum*
*Lecithaster salmonis*
*Megalocotyle marginata*
*Microcotyle sebastis*
*Opecoelina theregrae*
*Opechona occidentalis*
*Podocotyle abitionis*

*Sebastodes melanops* (Girard) Black Rock-fish
*Lecithaster salmonis*
*Megalocotyle marginata*
*Microcotyle sebastis*
*Opechona parvasoma*
*Tubulovesicula lindbergi*

*Sebastodes nebulosus* (Ayres) Yellow-striped Rock-fish
*Lepidapedon pugetensis*
*Megalocotyle marginata*

*Sebastodes nigrocinctus* (Ayres) Black-banded Rock-fish
*Tubulovesicula lindbergi*

*Sebastodes paucispinus* (Ayres) Bocaccio
*Derogenes crassus*
*Megalocotyle trituba*

*Sebastodes pinniger* (Gill) Orange Rock-fish
*Megalocotyle trituba*

*Sebastodes ruberrimus* Cramer Red Snapper
*Hemiurus levinseni*
*Lecithochirium exodicum*
*Megalocotyle trituba*
*Opechona alaskensis*

*Sebastodes* sp.
*Aporocotyle simplex*
*Deretrema cholaeum*
*Entobdella squamula*
*Gyrodactylus elegans*
*Opechona occidentalis*
*Podocotyle abitionis*
*Stephanostomum casum*

Family SQUALIDAE

*Somniosus microcephalus* (Schneider) Sleeper Shark
*Squalonchocotyle somniosi*

*Squalus suckleyi* (Girard) Dog-fish
*Squalonchocotyle abbreviata*

*Squalus sucklii*—see *S. suckleyi*

Family STICHAEIDAE

*Anoplarchus purpurescens* Gill Coxcomb
*Tubulovesicula lindbergi*
*Lumpenus sagitta* (Willimovsky) Pacific Snake Blenny

*Xiphister atropurpureus* (Kittlitz) Black Blenny
*Podocotyle atomon*

Family SYNGNATHIDAE

*Syngnathus grisco-lineatus* Ayres Pipe-fish
*Podocotyle atomon*
*Podocotyle reflexa*

Family THYMALLIDAE

*Thymallus arcticus* (Richardson) Arctic Grayling

Synonym: *Thymallus signifer*
*Crepidostomum farionis*
*Crepidostomum* sp.

*Thymallus signifer*—synonym of *Thymallus arcticus*

Family ZOARCIDAE

*Lycodopsis pacifica* (Collett) Black-bellied Eel-pout
*Pseudopcoelus vulgaris*

"Species of Fresh Water Fishes"
*Plagioporus siliculus*
*Plagioporus virens*

"Fish"
*Benedenia hendorfii*

## AMPHIBIAN HOSTS

Class AMPHIBIA

Order CAUDATA

Family AMBYSTOMIDAE

*Ambystoma gracile* (Baird) Northwestern Salamander
*Megalodiscus americanus*
Monostostome cercaria (encysted)

*Dicamptodon ensatus* (Eschscholtz) Pacific Giant Salamander
*Cephalouterina dicamptodonti*
*Euryhelmis pacificus*
*Halipegus occidualis*
*Megalodiscus microphagus*
*Phyllodistomum singulare*

Family PLETHODONTIDAE

*Ensatina eschscholtzi* Gray Eschscholtz Salamander
*Brachycoelium salamandrae*

Family SALAMANDRIDAE

*Taricha granulosa* (Skilton) Rough-skinned Newt

Synonym: *Triturus granulosus*
*Megalodiscus americanus*
*Brachycoelium salamandrae*

*Taricha* sp.

Synonym: *Triturus* sp.

*Megalodiscus americanus*

*Taricha torosa* (Rathke) California Newt
*Halipegus occidualis*

*Triturus granulosus*—synonym of *Taricha granulosa*

*Triturus* sp.—synonym of *Taricha* sp.

Order SALIENTIA

Family BUFONIDAE

*Bufo boreas* Baird and Girard Western Toad
*Ophioxenos dienteros*

Family RANIDAE

*Rana aurora* Baird and Girard Red-legged Frog
*Euryhelmis pacificus* (larval)
*Halipegus occidualis*
*Megalodiscus temperatus*
*Metagonimoides oregonensis* (larval)

*Rana aurora cascadae* Slater Cascade Range Frog

Synonym: *Rana cascadae*

*Euryhelmis squamula* (larval)

*Rana cascadae*—synonym of *Rana aurora cascadae*

*Rana pretiosa* Baird and Girard Spotted Frog
*Haplometrana intestinalis*

## REPTILIAN HOSTS

Class REPTILIA

Order CHELONIA

Family EMYDIDAE

*Clemmys marmorata* (Baird and Girard) Pacific Pond Turtle
*Neopolystoma orbiculare*
*Ophioxenos dienteros*
*Polystomoides coronatus*
*Spirorchis artericola*
*Telorchis corti*

Order SERPENTES

Family COLUBRIDAE

*Thamnophis ordinoides* (Baird and Girard) Red-striped Garter Snake
*Ophioxenos dienteros*
*Lechriorchis plesientera*
*Alaria marcianae*
*Zeugorchis syntomentera*

*Thamnophis sirtalis* (Linnaeus) Common Garter Snake
*Alaria marcianae*
*Lechriorchis plesientera*
*Ophioxenos dienteros*
*Zeugorchis syntomentera*

## AVIAN HOSTS

Class AVES

Order PELICANIFORMES

Family PELICANIDAE

*Pelecanus* sp. Pelican
*Proalaria* sp.

Order CICONIIFORMES

Family ARDEIDAE

"Birds of the Heron Group"
*Clinostomum marginatum*

Order ANSERIFORMES

Family ANATIDAE

*Anas platyrhynchus* Linnaeus Mallard Duck
*Echinostomum revolutum*
*Zygocotyle lunatum*

*Cygnus buccinator*—synonym of *Olor buccinator*

*Cygnus olor* (Gmelin) Mute Swan
*Sphaeridiotrema globulus*

Domestic Duck
*Notocotylus imbricatus* (Experimentally)
*Trichobilharzia elvae* (Experimentally)
*Trichobilharzia oregonensis* (Experimentally)
*Sphaeridiotrema globulus* (Experimentally)

*Olor buccinator* Richardson Trumpeter Swan

Synonym: *Cygnus buccinator*
*Echinostomum revolutum*
*Orchipedum tracheicola*
*Zygocotyle lunatum*

Order FALCONIFORMES

Family FALCONIDAE

*Falco sparverius* Linnaeus Sparrow Hawk
*Athesmia jolliei*
*Brachylecithum idahoensis*

Order GRUIFORMES

Family RALLIDAE

*Fulica americana* Gmelin American Coot
*Cyclocoelum mutabile*

Order CHARADRIIFORMES

Family LARIDAE

*Larus argentatus* Pontoppidan Herring Gull
*Gymnophallus deliciosus*

*Larus californicus* Lawrence California Gull
*Calactosomum humbargari*
*Pseudopsilostoma ondatrae*

*Larus canus* Linnaeus Mew Gull
*Aporchis continuus*

*Larus glaucecens* Naumann Glaucous-winged Gull
*Galactosom humbargari*
*Gymnophallus deliciosus*
*Cryptocotyle lingua*

*Larus heermanni* Cassin Heermann's Gull
*Galactosomum humbargari*

*Larus occidentalis* Audubon Western Gull
*Gymnophallus deliciosus*
*Parorchis acanthus*

*Larus philadephia* (Ord) Bonaparte's Gull
*Galactosomum humbargari*

*Larus* sp.
*Stephanoprora* sp.
*Apophallus donicus*

Family HAEMATOPODIDAE

*Haematopus bachmani* Audubon Black Oyster Catcher
*Echinostephilla haematopi*
*Levinseniella propinqua*
*Plenosoma minimum*
*Gymnophallus obscurus*
*Microphallus primas*

Order PASSERIFORMES

Family COMPSOTHLYPIDAE

*Opornis tolmiei* (Townsend) MacGillivray's Warbler
*Glaphrystomum propinquum*

Family FRINGILLIDAE

*Hesperiophona vespertina brooksi* Grinnell Western Evening Grosbeak
*Brachylecithum chivosca*

*Passerella iliaca* (Merriam) Fox Sparrow
*Concinnum burleighi*

*Passerculus sandwichensis* (Gmelin) Savannah Sparrow
*Paradistomum passerculum*

*Pipilo erythophthalmus oregonus* Bell Oregon Towhee
Synonym: *Pipilo maculatus oregonensis*
*Lutztrema monenteron*

*Pipilo maculatus oregonensis*—synonym of *Pipilo erythophthalmus oregonus*

Family TURDIDAE

*Ixoreus naevis naevis* (Gmelin) Pacific Varied Thrush
*Brachylecithum mosquense*
*Macvicella postnoporus*
*Lutztrema monenteron*

*Turdus migratorius* Linnaeus American Robin
*Brachylecithum mosquense*
*Brachylaeme fuscatus*
*Lutztrema monenteron*

## MAMMALIAN HOSTS

Class MAMMALIA

Order INSECTIVORA

Family SORICIDAE

*Sorex bendirii* (Merriam) Pacific Water Shrew
*Euryhelmis pacificus*

*Sorex bendirii palmeri* Merriam Pacific Water Shrew
*Xiphidiotrema lockeri*

*Sorex palustris navigator* (Baird) Water Shrew
*Xiphidiotrema lockeri*

Order CHIROPTERA

Family VESPERTILIONIDAE

*Eptesicus fuscus* (Beauvois) Big Brown Bat
*Allassogonoporus marginalis*

*Myotis californicus caurinus* Miller California Bat
*Acanthatrium oregonense*
*Allassogonoporus marginalis*
*Limatulum gastroides*

*Myotis evotis* (Allen) Long-eared Bat
*Acanthatrium oregonense*

*Myotis lucifugus* (LeConte) Little Brown Bat
*Acanthatrium oregonense*
*Allassogonoporus marginalis*
*Plagiochis vespertilionis parorchis*

Order RODENTIA

Family CASTORIDAE

*Castor canadensis* Kuhl Beaver
*Euryhelmis pacificus*
*Stichorchis subtriquestrus*

Family CRICETIDAE

*Fiber zibethica*—synonym of *Ondatra zibethica*

*Neotoma fuscipes* Baird Dusky-footed Woodrat
*Platynosomum fastosum*

*Ondatra zibethica* (Linnaeus) Muskrat
Synonym: *Fiber zibethica*
*Echinoparyphium contiguum*
*Echinostomum coalitum*
*Echinostomum revolutum*
*Euryhelmis pacificus*
*Notocotylus* sp.
*Notocotylus urbanensis*
*Plagiorchis proximus*
*Quinqueserialis quinqueserialis*

*Peromyscus maniculatus* (Wagner) Deer Mouse
*Euryhelmis pacificus*

Order PRIMATES

Family HOMINIDAE

*Homo sapiens* Linnaeus Man
*Schistosoma haematobium*

Order CETACEA

Family BALAENOPTERIDAE

*Balaenoptera borealis* Lesson Sei Whale
*Ogmogaster plicatus*

*Balaenoptera physalus* (Linnaeus) Common Finback Whale
*Lecithodesmus goliath*
*Lecithodesmus spinosus*
*Ogmogaster plicatus*

Family DELPHINIDAE

*Phocaena vomerina* (Gill) Pacific Harbor Porpoise
*Campula oblongata*
*Hadwenius nipponicus*

Order CARNIVORA

Family CANIDAE

*Canis familiaris* Common Dog
*Alaria arisaemoides*
*Nanophyetus salmincola*

*Canis latrans lestes* Merriam Coyote

Synonym: *Canis lestes* Merriam
*Alaria oregonensis*
*Alaria* sp.
*Nanophyetus salmincola*

*Canis lestes* synonym of *Canis latrans lestes*

*Canis vulpes* synonym of *Vulpes fulva*

*Vulpes fulva* (Desmarest) Red Fox

Synonym: *Canis vulpes*
*Nanophyetus salmincola*

Family FELIDAE

*Felis domesticus* Common Cat
*Alaria arisaemoides*
*Nanophyetus salmincola* (Experimentally)

*Lynx fasciatus fasciatus*—synonym of *Lynx rufus fasciatus*

*Lynx rufus fasciatus* (Rafinesque) Bobcat

Synonym: *Lynx fasciatus fasciatus*
*Nanophyetus salmincola*

Family MUSTELIDAE

*Mustela frenata* Lichtenstein Weasel
*Alaria mustelae*

*Mustela vison* Schreber Mink
*Alaria mustelae*
*Cephalophallus obscurus* (Experimentally)
*Euryhelmis pacificus*
*Euryhelmis squamula*
*Metagonimoides oregonensis*
*Nanophyetus salmincola*

Family PROCYONIDAE

*Procyon lotor pacificus* (Merriam) Raccoon
Synonym: *Procyon psora pacifica*
*Metagonimoides oregonensis*
*Nanophyetus salmincola*
*Pharyngostomoides procyonis*

*Procyon psora pacifica*—synonym of *Procyon lotor pacificus*

Family URSIDAE

*Ursus americanus* Bear
*Nanophyetus salmincola*

Order ARTIODACTYLIDA

Family BOVIDAE

*Bison bison bison* (Linnaeus) Buffalo
*Fascioloides magna*

*Bos taurus* Common Cow (Domesticated)
*Fasciola hepatica*
*Fascioloides magna*
*Paramphistomum cervi*
*Paramphistomum* sp.

*Capra hircus* Common Goat (Domesticated)
*Fasciola hepatica*

*Ovis aires* Common Sheep (Domesticated)
*Fasciola hepatica*

Family CERVIDAE

*Alces alces shirasi* (Nelson) Moose
*Fascioloides magna*

*Cervus canadensis* Erxleben Elk
*Fascioloides magna*

*Dama hemionis* (Rafinesque) Mule Deer
Synonyms: *Odocoilus columbianus*
*Odocoilus hemionis*
*Fasciola hepatica*
*Fascioloides magna*

*Odocoilus columbianus*—synonym of *Dama hemionis*

*Odocoilus hemionis*—synonym of *Dama hemionis*

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